



MEATBALL

NAVAL AVIATION JOURNAL

SPRING 2014



Night Flying

KEEP CALM IT'S JUST AUTOKINESIS



SHIFT YOUR GAZE AWAY AND BACK

**MONITOR YOUR INSTRUMENTS TO
RESOLVE CONFLICT**

**MOVE YOUR EYE, HEAD AND BODY TO
ELIMINATE ILLUSION**

**VIEW THE TARGET WITH REFERENCE TO
STATIONARY STRUCTURE**

**LT KK VERMA
INAS 339**

Foreword



R Adm DM Sudan
ACNS (Air)

*I*ndian Navy Aviation today stands poised on a springboard that would propel the Fleet Air Arm to hitherto greater heights with a quantum leap in our offensive capabilities.

At the heart of this lies the confidence and professional expertise of our aircrew to exploit our aircraft over the seas under pitch dark conditions, both from ashore and afloat.

As I reflect on my active flying days, some of the most cherished memories are those spent operating from onboard 'Mother', especially while flying at night, My 'bag' is full of exhilarating and challenging experiences, which have, without a doubt, brought me a great deal of personal and professional satisfaction.

As senior aviator, it is the duty of supervisory staff to inculcate a healthy balance of diligence, caution and panache amongst junior aircrew especially when it comes to night flying over sea. On their part, the younger lot must equip themselves with knowledge of both aircraft systems and aero-medical aspects associated with night flying, so as to optimally exploit their highly capable weapon platforms.

Moreover, as we continue our quest for excellence, the endeavor would be to enhance the quantum of night flying undertaken, both ashore and afloat. After all, the *raison d'être* of every professional Naval Aviator is to be professionally competent so that he/she can unleash the potential of his/her weapon platform even under limiting conditions of weather and visibility.

The present issue of 'Meatball' contains some well researched articles that would not only make an interesting reading, but also serve to throw light on the nuances of night flying.

Happy Landings...Always,

A handwritten signature in black ink, consisting of several vertical strokes followed by a horizontal stroke that curves to the right.

Editorial



I happen to be the new man on the job and it has been an experience (literally) compiling this edition of Meatball amidst the chaos of tackling the incidents of FOD, Bird Hits and avoidable Ground Accidents. The S.O.S sent out by my predecessors to the willing community members of the Navy still stands relevant. Please render articles/poems/anecdotes/experiences...albeit not plagiarized. It is my job to edit and I will do it wholeheartedly, so as to do justice to the efforts of my brethren. I am happy to note the positive response received via articles on the topic of Night Operations.

Here is a little bit I wish to share. Read on

Fire! Fire! Fire! ... C R A S H!... Search And Rescue!

The first letter of each word prompts each of the 11 Night Visual Illusions:

- **F** – False Horizons
- **F** – Flicker Vertigo
- **F** – Fascination

- **C** – Confusion with Ground Lights
- **R** – Relative Motion
- **A** – Autokinesis
- **S** – Somatogravic Illusion
- **H** – Height Perception Illusion

- **S** – Size / Distance Illusion
- **A** – Altered Planes of Reference
- **R** – Reversible Perspective Illusion

It is, of course, important to learn how to recognize and react to each illusion.

And that's it! A simple and easy way to remember the 11 Night Visual Illusions. I love the mnemonic and think it's the absolute best way to remember the night illusions. But, I did not create it. I saw it the first time over 20 days ago in the United States Army website, and then again in the United States Coast Guard website when trying to access their airline libraries on the subject of Night operations .

Until next time, enjoy flying, look out for each other and be safe.

Wishing you Clear Skies and Happy Landings Always,



Some Night Flying

MANTRAS

Cdr Sanjay Gopinath
INAS 550

*M*ost of the time 'Night Flying' is enjoyable... well at least when I was a young Turk, trying hard to get some flying hours, it used to be. Is it not now? When you're a married man trying to balance the scales of domestic duties, homework, shopping, movies etc. against night ORR, AFT and night training syllabus the balancing act is tough. Now coming back to what I was saying. Night is an enjoyable time to fly. Night is a seductress, weather is usually better, aircraft performance improves because of low temperatures, air is smooth, turbulence is less, visibility is better and the ground looks fabulous with well lit cities.

So if everything is so good what is the real challenge in night operations? Statistics say that about 10% of flying accidents occur at night. This probably would suggest that it is not too rosy to fly by night. It has its own difficulties and dangers. It is for sure that the aircraft, its equipment and systems are the same whether it is day or night. The aircraft does not know that it is dark outside! So problems arising from night flying are related to the pilots for sure!! Let us consider some aspects which are vital for night operations.

- **Planning and Preparations for a Night Sortie**

- ◆ Be current by day. There is absolutely no doubt that your currency by day will definitely help you in quick adaptation to night flying.

Follow INAP II and other latest regulations laid down regarding night flying.

- ◆ Any emergency which may occur will be compounded by the difficulty in carrying out the actions in a dark cockpit.

- ◆ Planning for force landing sites will be difficult.

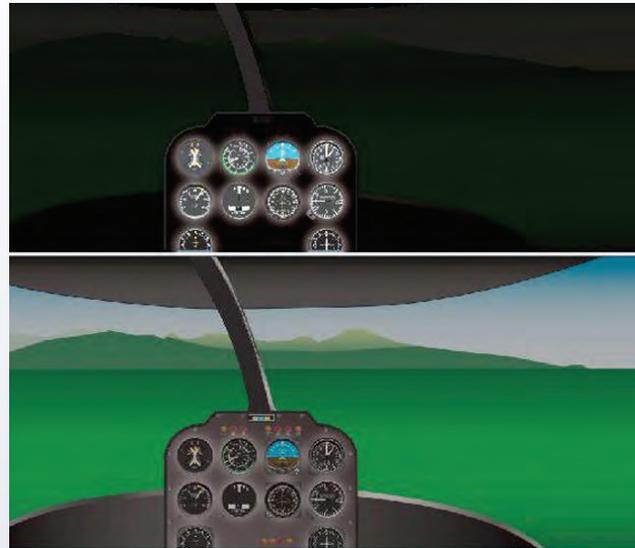
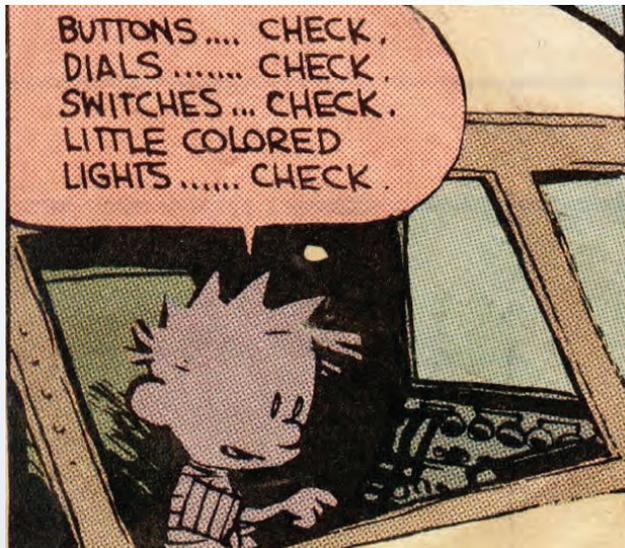
- ◆ Fly at higher altitudes/ flight levels when possible. Extra height is always welcome.

- ◆ Prepare your map well. Study the route well on a cross country sortie. Plan your alternate airfields well. Double check whether the diversionary and en-route airfields are open. Look for the watch hours in the FLIP or check with ATC.

- ◆ Carry your personal torch (obviously with serviceable batteries!!).

- ◆ Sleep well/ rest well before that 'routine night sortie'. Your body does not necessarily give you adequate warning signals of fatigue. If you are planned for night flying definitely take rest in the afternoon (Senior Pilots to ensure).

- ◆ Stating the OBVIOUS.....Skip the station/ squadron PLD in the afternoon if you are flying at night!!!!



- ◆ Do not, repeat DO NOT forget your preflight meal. It is important.
- ◆ Know your SOPs regarding night flying emergencies, ATC signals, any special briefings regarding obstruction lights, sterile heights, procedure for u/s RT etc.
- **Take off and Climb**
 - ◆ Initial part of flying after takeoff is to be strictly on instruments. Remember the call out taught to you by the instructor....eg. "UP and away from the Flare path". ADI showing 10 deg pitch up. VSI and altimeter showing a positive climb. Brakes, undercarriage up".
 - ◆ Call out of "turning to right.....left front right clear.....no moving light" is very important.
 - ◆ Adapt to the new environment slowly and steadily. Allow your eyes to adapt to the darkness outside and control the cockpit lighting.
- **Enroute**
 - ◆ Keep yourself busy while proceeding to the exercise area over sea or flying a route sortie. If it is a late night sortie your circadian rhythm will tend to put your body to sleep. The vibrations, the warmth of the cockpit, the dark settings outside are all recipe for a good nap. Beware!!
 - ◆ Your mission requirements would solve the problems of boredom and keep you busy but this may also cause early setting of fatigue at night.
 - ◆ Know about the night illusions that you could be subjected to. Warn yourself against falling prey to one of the many night illusions and disorientation. If you are in a multi-crew cockpit, help each other.
 - ◆ CRM at night is crucial and more critical than in day flying. Go strictly by the checklists and SOPs. Remember fatigue levels may be different and on a long night MR sortie CRM could save your day.

- ◆ Weather can play havoc. Remember seeing and avoiding clouds during day was child's play, but the same at night could be difficult. Weather avoidance either by visual means or by using the weather radar comes with experience. Practice this well during your day sorties to get a good hang of it. Get thoroughly briefed on weather by the MET section.
 - ◆ If you suddenly lose sight of stars, you may be flying under or into clouds. If ground lights begin to look hazy, you may be flying into a layer of clouds or fog.
 - ◆ If flying in clouds, the anticlockwise light may cause vertigo. Do not hesitate to switch them off for some time if required.
 - ◆ You can use your landing light to look ahead for clouds when you are in doubt. Trust me I have done that many times and got saved from entering monstrous CBs when my weather Radar was not working.
 - ◆ Be always prepared for an emergency. Engine failure at night is not more likely at night than during daytime, but the fact is that handling the same emergency at night has its own complications and challenges. Force landings could be that much more challenging if you really cannot see where you are landing.
- ◆ Ask for an assisted approach like a QGH, PAR, SRA etc if available. This will give you confidence in the DATCO.
 - ◆ Altimeter settings are critical when the ground is not visible. Know the latest QNH/QFE and set them correctly.
 - ◆ Always try and correlate with the nav-aids. Eg. Even if you are on a visual approach cross check with the ILS localizer and glide slope.
 - ◆ Use PAPI and VASI judiciously.
 - ◆ If you do not have the flare path in sight.... Announce it on RT. Do not feel shy.
 - ◆ Know the position of the age old signal square.
 - ◆ Know your night signals (They are not there just to be studied before a FSI gentest).
 - ◆ Not all parallel rows of lights are necessarily a flare path!!!! It could be a well lit high way! Pilots all over the world have known to have made approaches to lighted roads and highways.
- Since night flying is such a challenge.....people adore pilots who fly during night.....but, people detest pilots who fly-by- night.
- **Approach and landing**
 - ◆ Know your airfield terrain well.
 - ◆ Practice instrument approach letdowns frequently.

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NIGHT FLYING

THE WAY I SEE IT...

Lt Cdr TM Joseph
INAS 550

All of us are very familiar with the basics of night flying and the literature involved with it. The need to adapt one's eyes to darkness and the rules and regulations of night flying are always at the back of our palms. Most of us can parrot back the requirements of flying at night like the requirement of the first pilot to have a valid Instrument Rating Category. All these regulations are to ensure that the pilots have the experience and maturity to fly at night.

These extra measures are put in place for night flying because of the difficulties in flying by night compared to flying by day. But, like small children who worry about what's under the bed, do we really know what can reach out and 'get us' on a night flight when we least suspect it? The risks at night are different and higher, but they can be quantified and mitigated by pilots who are cautious and well-versed in techniques for flying safely at night. But there are pitfalls, some of which aren't adequately addressed in flight training that continue to claim even high-flying pilots in night accidents. This article discusses the pros and cons of flying by night.

The Pros

➤ There are a lot of great reasons to fly at night, and pilots who choose to should embrace

it and learn more about it. For starters, the views can be truly spectacular. Metropolitan areas are extremely well lit, and the lights sometimes look like jewels spread over the cityscape. I am sure all of us have travelled by civil airliners and it is a very common sight to see the passengers around us frantically looking down the aircraft to get a glimpse of the city. Metro areas are probably among the safest places to fly at night since, even on a moonless night, the bright lights from below make it easier to spot adjacent terrain and obstacles.

➤ If you want to avoid turbulence, night and early morning is one of the best times to fly. Winds die down at night, which reduces turbulence, particularly over hills and terrain. Thunderstorms also tend to dissipate at night, which enhances safety in regions prone to storms. There's also far less competing air traffic at night. When we fly out of our Local Flying Area (LFA) it is less strenuous to contact civil agencies since less than 2% of General aviation flying is done at night. Thus, at night there is less competition for the airspace, and ATC will have more time to talk to you. Aircraft are also easier to spot at night, though occasionally it's harder to perceive how to avoid traffic at the same altitude.

The Cons

Many things are different that make night flying more inconvenient. Some of the differences also make night flying more dangerous.

- First, we're not nocturnal creatures, and it's much harder for us to see at night. Our eyesight is best suited for the day, and almost everything we do at night just becomes a little harder. This includes pre-flight checks of the aircraft, finding switches in the cockpit, taxiing, reading maps, spotting terrain and obstructions, and of course, landing the airplane. Navigating becomes more difficult, since checkpoints are harder to identify. If the requirement arises to land at other civil airports, many airports have fuel available only during working hours and have no services at night. In fact, some airports aren't even lit and so don't permit night landings.
- Fatigue is also a factor. Most people are tired at the end of the day and may not have the same judgment and reaction time they have in the daytime. Spatial disorientation, which can lead to loss of control of the aircraft, is also more likely at night, particularly on dark or hazy night that lacks a clear horizon. Inadvertent flight into a cloud is far more likely at night than in the daytime, since clouds are difficult to spot at night even under the best of circumstances.
- Probably less than 5% of general aviation flying is at night, yet half of the VFR into IMC

accidents occur at night, which suggests that it is 10 times more likely to have this type of accidents at night. In unpopulated areas with little light, it may be impossible to see and avoid clouds. Emergencies are also more difficult to manage at night. A generator failure leading to a loss of electrical power may be a minor inconvenience in the daytime, but becomes more serious at night. And if you were to have an engine failure at night, selecting an appropriate off-airport landing site would be far more difficult than it would be by day.

Conclusion

Night flight is challenging and people deal with it in different ways. Some educate themselves on the risks and set their own personal minima's for the conditions under which they're willing to fly at night. Either way, understanding all of the factors that affect night flight will make us a safer pilot. Certainly, night flight is different and requires more care and planning. It also requires an understanding of the illusions but knowledge may not be enough. In a study conducted, it was found that even though pilots were aware of the black hole illusion, most of them still continued to fly too low. So develop your own strategies for night flight and enjoy the view!

Author Lt Cdr TM Joseph is an alumnus of NDA, 110th course and presently posted in INAS 550 as Staff Observer.

*"...the safety of the operator is more important than any other point.
Greater prudence is needed rather than greater skill."*

— Wilbur Wright,

AIRCATS OBSERVATIONS - NIGHT OPERATIONS

Night flying operations demand a high level of aircrew proficiency that calls for enhanced safety consciousness. Supervisors must ensure adequate impetus on correct flying practices and exhibit clear understanding of capabilities of the aircrew as well as the aircraft.

Recent visit to air stations during FSI has revealed incorrect understanding of aircraft capabilities and misinterpretation of higher directives resulting in limited utilization of aircraft as well as formulating inappropriate procedures by supervisors. Relevant issues are highlighted below:-

Conduct of Chetak Night Flying. IHQ MoD (N) in a recent policy directive has discontinued Chetak afloat flying by night until fitment of Emergency Flotation Gear. However, some air stations have interpreted the directive as prohibition for flying over 'water bodies' such as canals, rivers or lakes during routine ashore flying resulting in the aircraft flying over populated areas while in circuit as well as during transit to/from sectors. Further, some stations have imposed restrictions on conduct of ashore night flying for Chetaks only during moon phase conditions. The Chetak SOP mandates flying by night should be undertaken in 'contact' conditions, which enables visual flying with minimum reference to instruments. While 'contact' conditions may be available on a non moon phase night in places that have good background

city lights, a hazy moon lit night without adequate city lighting may not provide the necessary 'contact' conditions. It is, therefore, pertinent for station and squadron supervisors to correctly interpret the regulations to prevent imposing unnecessary restrictions on aircraft operations and enable safe conduct of Chetak ashore flying by night.

Night U/S R/T Recovery Procedures for Helicopters at Air Stations. During FSIs of Air Stations it has been noticed that recovery of helicopters experiencing U/S R/T and total electrical failure involved a minimum of two circuits. Considering the capability of helicopters to hover, it is considered inappropriate to carry out additional circuits while experiencing an emergency. AIRCATS during FSIs has recommended promulgation of emergency helipad and procedures for recovery that do not interfere with other aircraft operations on the main runway. These procedures are also applicable for aircraft with U/S R/T experiencing undercarriage malfunctions. Units are to devise methods to enable aircraft to indicate emergencies with U/S R/T requiring full length of runway for recovery such as single engine failure, tail rotor cable rupture etc.

It is necessary that units undertake periodic review of promulgated procedures, especially for night flying operations to evaluate their efficacy and make timely amends for conduct of safe flying.

IT HAPPENED TO ME “TWICE”

Lt G S Reddy
321, Parundu Flight

*A*s a young aviator I always believed that nothing would happen to a machine until you push it beyond the envelope. Even during my training I was told that an aircraft gives adequate symptoms before giving up.

Incident I

On that fateful day I was planned as co-pilot for a routine night flying practice sortie. Runway flying was a delight since I had recently joined Parundu from Shikra where I missed the runway altogether. We took off and carried out circuits initially after which we climbed to 1000 ft and proceeded to West of the airfield maintaining 60 kts. After about 40 mins of flying we decided to return for crew change. The moment we decided to turn towards the field, the aircraft yawed to the right and the engine RPM started winding down slowly. Promptly the first pilot announced engine failure and the last I saw was engine RPM around 28000. Suspecting engine failure I was ready to put FSL (Fuel Shut off Lever) back to cut the fuel supply. However, after collective was lowered to enter autorotation, the engine RPM started restoring. I switched on the landing light and called out 'winds from south'. The First Pilot decided not to turn into wind in view of close proximity of extra high tension wires running south of our position. We transmitted the emergency on R/T but tower could not read us clearly. The engine RPM restored at about 0.2 collective pitch setting which was insufficient for

level flight. As we were coming closer to the ground, I could see a white patch in the dark and gave continuous commentary about the landing site. Close to ground, the first pilot came up on collective to arrest the ROD and all eyes were outside to land in a level attitude and avoid any damage. A thick layer of dust rose and cluttered the beam of landing light thereby limiting the visibility of the forced landing site. There was complete silence in the cockpit barring the sound of heavy breath on the intercom. The other aircraft in the circuit was diverted to ascertain the situation. We made a safe landing and exited to check the damage to our aircraft. We couldn't miss the huge palm tree in close proximity to the landing spot and our glances towards each other said it all. In the dark we saw local villagers rushing towards us with torch lights. I managed to communicate in broken Tamil and asked the name of the village. I informed the name of the village on mobile phone and GSARP was activated immediately.

It was a disturbing experience for both of us...to say the least!

Incident II

Less than a month later I had a taste of another mysterious incident suspected to be a Clutch/ Free Wheel assembly failure. I was planned as co-pilot for AIRPAT (Air Patrol) sortie. Unlike other days we had an early take off. We completed the sortie profile

and were at 1200 ft gradually climbing with an ROC of 200 feet per minute to 2000 ft. Suddenly, the aircraft yawed to the right with loss of height of over 600 ft. Though there was no change in the engine noise I felt as if the main rotor had flown off as we had lost sight of the main rotor blades. We almost were in a free fall with a few parts of our helmets thrown back due to Negative 'G'. After the ROD stabilised the first pilot immediately lowered the Collective and the aircraft settled down in an auto-rotative descent. My eyes searched for the rotor tachometer which indicated normal parameters. Next thing was to look for a suitable forced landing site to affect a safe landing. Considering that we were on a thin strip of land near Dhanushkodi, with sea on either side, the options were limited. The first pilot transmitted the suspected clutch slippage problem and commenced the approach towards a damaged road for landing. The images of my previous forced landing flashed in my mind. We switched off the aircraft on landing and awaited assistance. Immediately there was a gathering of local crowd and passing by tourists

going towards Dhanushkodi tip. Police and the local authorities were informed on mobile phone .

Afterword: These two back to back incidents in less than a month, with me being the common factor had completely changed my view of flying a single engine aircraft. It can happen to anyone anytime. Luckily I survived the rotating components of the chopper in both the incidents. As a budding Naval Aviator I'll take these two memorable incidents as an experience and pass on the lessons to other fortunate navigators.

Editors Comments: In my view, other than the luck factor, training plays a vital role in handling the emergencies at night. The experience of the first incident by night, rather, helped you in handling the emergency by day with composure. There is an important lesson in the decision taken by the first pilot of not turning into wind by night view the presence of high tension wires.... Know your LFA and terrain thoroughly as judgement comes with knowledge. The professionalism displayed by you in both the incidents is well appreciated.



LESSON OF A LIFETIME

Lt Cdr Augustine Thomas
INAS 550

Everyone has a first of everything at some point in life and that moment remains etched in one's heart forever. First pay, first car, first love, first kiss are a few amongst them which always remain closer to the heart than the seconds or the thirds. If you think I am going to talk about my first night sortie describing how an exalted nascent aviator felt soaring above the dark stretch of horizon; Sorry!! I have to disappoint you. In the succeeding few paragraphs I would be narrating an incident which was a first of its kind for me which I would endeavour to make it the last too.

As any of the young pilots baptised into the new exciting and stimulating world of flying, I too was eager and longed to get airborne time and again. The joy and satisfaction I found in the cockpit was unparalleled (of course barring few swears and occasional "PAT" from my instructors who believed that they were teaching a monkey to fly). Day after day, I used to listen to the rules and regulations about fatigue limits and compulsory rest before flying but never gave it a serious consideration. When experienced pilots used to stress upon the topic of crew fatigue and stress management, at various flight safety meetings and lectures, I ignored them thinking that these didn't matter and believed that the limits were set for those aged and unfit people.

But on that eventful day I who ignored to learn from others mistakes was taught a lesson the harsher

way. I was serving in the most operational squadron of the Indian Navy. The squadron was going through a hectic operational cycle and the crew was tested and tried for their stamina. I had just got back into flying after a break of eleven months owing to an injury and was eager to catch up on my lost flying hours. Signs of weariness were evident on everyone but I blissfully ignored the fatigue cues and reassured myself saying "These are not meant for me, I am a young gun. Tell all these to those rusted ones".

That Fateful Night. I flew for about four hours towards a fleet requirement mission during the day. On landing I was told that the flying programme was re-hashed view additional tasking and I was required to fly at night for a routine surveillance mission. The Senior 'P' then added that the crew planned for night sortie were to secure at lunch time and were to take rest in the afternoon – an advice I ignored and repented later. Post landing I got busy with the pending work in the Squadron Staff Office as I was also the Staff Officer of the squadron. Since it would be time consuming I decided to skip lunch and have a snack instead in the squadron breakfast room. I got engrossed in some file/ report compilation and was not aware of the time ticking by. Next thing I noticed was the hour hand of the clock passing 5 indicating 1700 hrs and the night crew trickling into the squadron. They were fully rested and ready for the mission, whilst I had been working in the squadron fully confident of my physical stamina and endurance.

Post mission briefing, pre-flight meals and authorisation we manned the aircraft. Thereon the tell-tale signs of fatigue started manifesting with me missing few checks and call outs during start-up of the engines. I didn't take it seriously because it was a one-time error and I thought I was better. The captain of the aircraft warned me of my mistakes but didn't admonish me as they were not considered grave. But that was just the beginning; it was downhill thereafter. At one point I misheard a radio call and turned on to the wrong taxi link against the advice of ATC. After getting airborne I put the aircraft into a climb and unintentionally infringed upon the height restriction cleared to me. Halfway into the mission, it came as a shock when I realised that I was not able to concentrate. I felt miserably tired and sleepy. I didn't have the will to complete the mission and was staring continuously at the clock trying to wind it ahead with my glare. The experienced senior pilot on my right understood my plight and made me realise the importance of proper rest. He advised me to have a cup of coffee to keep sleep at bay and get involved in the mission.

The sortie dragged for the next few hours, albeit safely, thanks to the sixth sense of the experienced Senior 'P' on my right who always sensed when something was about to go wrong. He would know when I was about to make a mistake and would correct me before I could commit the blunder. I was completely drained by the time we completed the mission and turned back to base for landing. My co-pilot told me "Son, you have been a disaster in the aircraft today and only you are to be blamed for such a poor display. I have helped you to the extent I can but I am not cleared to land the aircraft from the right and you have to do this part yourself".

Strangely I mustered enough energy and attention (owing to fear of life I guess) and was cross checking each and every parameter for flying the aircraft smoothly and precisely. We called for finals and commenced the approach sequence for landing. All flight parameters were correct and all vital actions prior landing were carried out. I executed a smooth flare out and touch down. As soon as I felt the wheels touch the ground I relaxed slightly giving a breather to my worked up senses. But I didn't realise the waiting disaster as the aircraft slowly started drifting to the left during deceleration. I gave a minor correction, looking at the far end of the runway trying to get back onto the centreline. But the fatigue slowed down my reactions and my mind was racing behind the aircraft. I was not in control of the machine and to add to my woes I was not comprehending the seriousness of the situation till my co-pilot shouted "where are you going, you are at the centre of the left lane, your wings are at the fringes of the runway". With a jolt I gave a hard right rudder which resulted in the aircraft getting into 'Pilot Induced Oscillations' on the runway. Somehow I managed to decelerate and get the aircraft under control. I taxied back into the dispersal and shut down the aircraft safely.

That particular night turned out to be a wakeup call. Never again did I ignore any rule, however trivial it seemed and always made it a point to sleep, take adequate rest, and have pre-flight meals irrespective of the sortie duration. And I hope this experience of mine might be a lesson for other "hot-shots" who tend to believe they are immune to fatigue and stress.

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1 LEARNT FROM THAT NIGHT...

Lt Cdr Umesh Singh
INAS 339

*K*amov 31 has always been a testing helicopter for pilots as well as observers, due to the unique single pilot - single observer cockpit configuration. It's all the more challenging for an observer as, for the very first time, he shifts from the operational desk situated behind in a Dornier (during ab-initio training) right into the cockpit sitting next to the pilot. He dons the double hat of being a TACCO and the co-pilot. He needs to remain 'clutched-in' with the pilot during checks & procedures and assist in emergency handling, including complex emergencies like gear box/ double engine failure.

Deck operations especially during night, throw up tremendous challenges to all aircrew. In the KM 31, the job becomes even more daunting for the observers as they need to assist the pilot with respect to the glide path and alignment till sitting down on deck, as the pilot maintains completely on instruments till short finals.

During the night in question, I was planned for DLPs/ SCAs as part of my conversion syllabus from INS Hansa. I had already completed deck landings by day which I soon came to know, was a cake walk compared to what was in store for me that night. We took off and were well deep into the dark sea as I strained my eyes to spot the deck. Though it was moon phase, the haze reduced the horizon to a blurry streak, seen only with great difficulty. It took me almost 10 min to locate the faint masthead lights

of the ship after the much experienced pilot spotted them first. Finally, we settled in the circuit pattern and called overhead.

Depth perception was non-existent and there were no visual references barring the few lights illuminating the deck. On finals, I could see only two lights in close proximity of each other which we were supposed to aid me in alignment!! The GPI, even at maximum brilliance, was only visual when we were about 2 km from deck, primarily due to the haze. It dawned upon me that landing on deck by day and on runway was far easier than by night. It seemed as if I was heading into a black hole with few lights making no sense amongst the blanket of darkness ahead. I was amazed how pilots carry out such landings by night on a moving platform of size 12*12 m. Nevertheless, instructions by my instructor from the centre seat soon cleared my muddled and overworked brain. We did a few circuits of duals wherein I was given enough exposure and confidence to make this task possible - or so I thought. Then I was given the opportunity to guide the helo onto the deck.

As luck would have it, the pilot though qualified for night DLPs, was not so current in the recent past. But I had full faith in his piloting skills. Checking that the height was being maintained at correct ranges (provided by the ship) and assessing the alignment was the only way to establish that we were on the correct glide path, which was being continuously

monitored by me. To make matters worse, the data link which provides range from ship was not operational that night. So I had to depend on the ship for ranges. In short, I was left with very little spare mental capacity. On short finals, I started giving the standard calls “Approaching quarterdeck”, “Crossing helo deck”, “Entering landing circle”, “Crossing aft bum line”, “On top” etc. I realised that helicopter was far more unstable as compared to the previous approaches which I initially attributed to the lack of currency of the pilot. However a quick glance inside the cockpit told a different story. The Auto Pilot had tripped! It was a momentary phase where I experienced complete black out in the cockpit. The decision to perform a landing or to abort the mission was a crucial one and my instructor who was expecting me to do something but found me still recovering from the shock, did not hesitate in calling for aborting the landing. The pilot responded promptly, and we slid out of the deck and took off. Auto pilot was re-engaged manually and after ascertaining our position we aborted the mission and headed back to base. The FRC actions ensued thereafter.

I probably learnt more about night flying in that one sortie than all my training so far. It made me realise few very important aspects of afloat night flying which are:

- Have complete faith in your instruments.

- Deck landings by night require a lot of team effort and perfect CRM.
- A single failure on part of a single individual in the chain can lead to a catastrophic mistake. A little complacency on part of the crew is unpardonable and it will not spare one’s life and the aircraft.
- One has to be quick in thinking and prompt in making decisions.
- Pre flight briefing is as important as the mission. It was a mere co-incidence that we discussed the same emergency in the briefing, but I guess fortune does favour the prepared mind.

You may have heard the adage that a landing you can walk away from is a good landing and a great landing is when you can use the aircraft again. No doubt, we had a great one that night.

Author Lt Cdr Umesh Singh was commissioned on 07 Jan 08. The officer was awarded wings from Observer School on 19 Feb 13 and was adjudged Best in Flying and Best Trainee for his all-round performance. He is currently posted in INAS 339/INS Hansa and is undergoing conversion on Kamov 31 helicopter.

“Instrument flying is an unnatural act probably punishable by God.”

— Gordon Baxter

FONA's Corner

NIGHT OPERATIONS

*I*n any military operations, the cover of darkness is an opportunity to engage the adversaries by surprise. This is not only due to the inherent element of surprise but also the difficulties in detection and period of least watchfulness. Conversely, and for similar reasons, it entails an element of risk which needs to be managed by both an appropriate level of training and availability of requisite technology. The goal of night operations is not making night into day but to exploit technology, SOP, tactics and training to achieve the capability to employ own aircraft round the clock.

The challenges of night flying are neither aerodynamic nor aircraft related. Instead, they are mainly due to operator skill, alertness and perception. Thus, flying by night in itself is not any more dangerous than it is at day, in fact the meteorological conditions by night make aircraft handling much easier, but it is definitely less forgiving and therefore needs

concerted efforts in planning and adequate practice. The challenges of night flying need therefore to be managed by a high level of operator training, management of bio-medical rhythms, and appropriate technological aids.

Typically the IN caters for 20% of the total flying task to be flown by night. In the year 2013 -14 out of a total of 35670 hours of flying allotted to various units 7615 hours were allotted towards night flying. It is observed that a total of 80 incidents have been recorded by night out of a total of 478 incidents as on 25 Mar 14 amounting to a proportionate 16% of the total incidents.

Human beings are predominantly daylight creatures. Evolutionary adaptation has resulted in the human species associating its own state of wakefulness and activity with the day/ light period and its sleep and rest state with night/

CHALLENGES	METHODS OF MITIGATION
SKILL	TRAINING / PRACTICE
ALERTNESS	MANAGE BIO RHYTHMS
PERCEPTION	TECHNOLOGICAL AIDS

dark period. Working in shifts interferes with the biological and social rhythms, forcing human beings to adapt themselves to unusual work schedules. Whilst working at night, there is a need to alter the sleep-wake pattern and adjust body functions to an inverse rest activity period, such that the individual can work when they should be sleeping and sleep

when they should have been awake. Such adjustments entail progressive phase shifts of the body rhythms, which increases with the number of successive night work periods. The circadian system is exposed to a continuous stress in the attempt to adjust as quickly as possible to the new working hours, while at the same time being invariably frustrated by the

continuous “changeover” imposed by the alternating shift schedules. Therefore, normally it is difficult for personnel to adjust completely to the changed cycle; this is also because family and social cues are diurnal and workers immediately go back to their normal habits during rest days.

In the naval context night flying needs to be viewed in light of the fact that missions undertaken at night are required to be flown with the same amount of alertness and alacrity as during day, if not more. Therefore the whole process needs to be viewed holistically, ensuring that the three aspects of training, bio-rhythms, and equipment are well prepared. It must be borne in mind that the process for night flying begins with ensuring that the mind and body are adequately rested in preparation of night flying. Shifting the body rhythm to adapt to night operations also involves the proper intake of food at the right time, night vision adaptation and finally preparation towards the mission. Regular instrument flying practice and ensuring that one holds the optimum rating / category would go a long way in building up both confidence and proficiency in night flying. Ensuring availability of suitable lighting for preparation and serviceability of all aircraft/ ground

equipment is essential to ensure safe and effective night flying operations.

Safety of flying operations cannot be ensured without first ensuring safe and effective maintenance practices. The night adaptation of the maintainer who works on the aircraft well into the night, the lighting conditions available and conducive work environment are equally important in ensuring that not only the aircraft repair/servicing is effective, but also that the odd tool, torch or cleaning gear does not take on a role change as FOD.

Safety Audit

Based on Naval Headquarters directives Safety Audits of all aviation units will be carried out by the Operational Safety Audit Team at least once a year. Accordingly, Safety Audits will be undertaken during ORIs and FSIs of Air Stations. A check off list to enable units to prepare for the audit has been promulgated vide HQNA letter 54/716/1 dated 20 Mar 14. All aviation units are advised to undertake period internal/ self-audits utilizing the check off lists for achieving higher standards of Flight Safety.

Common Night Accident Factors:

Statistics

- 66.7% of instrument approach accidents happen at night.
- Only 2% of general aviation flying takes place at night.
- 11.5% of accidents occur at night.
- 19.4% of accidents occur in weather at night.
- 22.9% Occur on approach before reaching the runway.
- 46.7% Occur on an instrument approach at night.

Likely causes

- VFR into IMC.
- Descent below IFR minimums without airport in sight.
- CFIT on approach, takeoff or during go-around.
- CFIT into terrain or water.
- Improperly set nav aids.
- Night greatly increases the hazard and likelihood of a weather related accident.

- FAA

NOBODY ASKED ME BUT WE NEED TO FLY MORE BY NIGHT

Lt Cdr Gokul Suresh
INS Viraat

How do you possibly explain finding yourself at 0.8 mile on finals, at night weather down, deck moving, hyperventilating into your mask, knowing that it will take everything you have to get aboard without killing yourself?

Art Nalls

*I*t was a cool night at Goa, the temperatures being lowered by the ominous “Western Disturbance” sneaking across the Pakistan border, bringing with it winds of 18 kts which occasionally gusted to 25 kts. Vivek and I while sharing a quick nicotine break outside the crew room searched the skies for any sign of the moon, knowing well that moonrise was after 2300 and that too at only nine percent. Both having been rated recently and just reported to the Ops squadron, we were raring for an opportunity to put our night flying skills to the test and execute some stealthy interceptions under the cover of darkness.

Having completed our calculations and the mission brief, as we reached for the Authorisation book to enter the sorties, the tension was evident on the authorizing officer’s face. With the crosswind component and the limit for night being 15 kts, the conditions were marginal. Nonetheless, with a thorough briefing of how to keep the jet on the runway, we were launched. The recovery though was not anything like we had seen earlier, with the aircraft’s nose pointed over 10 degrees off the centerline. In an aircraft where there is no drift correction (none of the “here I round off; nose straight, no drift”), it was an eerie feeling, yet safe.

Coming to why I chose to narrate this incident. What’s the difference between day and night flying that makes a benign sortie like an air interception exceptionally frightening? Is it lack of visual cues, lack of depth perception, the (unnatural) feeling of flying looking only at instruments, or the hype associated with night flying? In my personal opinion... It is simply that we don’t do enough of it. It’s the same as the first embarkation where a vertical landing seems tough and disembarkation after a prolonged embarkation where a slow landing (not really slow @140 kts) seems frighteningly fast. It’s a fact that only 20% of a unit’s AFT is night flying and units often struggle to achieve it.

One might argue-Why fly at night? If the Chetak fleet could put a stop to it, why not everybody else? One must understand that if an aircraft is certified as IFR capable, i.e. it has the necessary instrumentation and NavAids to comply with Instrument Flight Rules, there is no reason why it shouldn’t fly by night. Instrument Flying is taxing on the senses simply because of loss of visual inputs which contribute up to 90% of all sensory inputs received by the brain. Don’t you agree with me when I say that the only way

to train the brain is to keep it working hard? And what better time than at night? As a part of the military we all have to understand that when hostilities break out, there is no longer going to be a requirement for ratings, servicing, briefings or weather minima. We as warriors, are expected to take what we have, go where we have to and do what we are told to. Why not be good at it in the first place so we can come back from such sorties and go back to do more damage. (Unlike the movie Border-where the IAF waits for the sun to start rising before they can help their troops on the ground).

Night flying is where one needs to develop the confidence to handle the aircraft, its systems and the necessary skill levels to operate the aircraft in trying conditions. It is a bonus that it's quieter, calmer and you get a couple of hours of sleep in the afternoon. I will in fact go on to say that all emergencies (asymmetric landings, AFCS failures, practice force landings, autorotation etc.) should also, be practiced

at night. In addition at least half a units AFT should be at night and stations are to provide night flying facilities every day and not just on two days a week. It is only such radical moves that will let the operators of aircraft with cutting edge technology learn to exploit them in a safe manner when the 'going gets tough'.

It is my personal view that aircraft which are not IFR certified should not be allowed to fly by night as they are not designed with the essential instrumentation or Nav aids. Moreover the aircrew flying these aircraft should not be rated as the aircraft cannot fly in bad weather and hence a rating would be inconsequential.

Editors Comments: Your view on not allowing non-IFR certified aircraft to fly by night is unjustified. Please refer to AIRCATS observation on conduct of Chetak Night Flying for understanding the rationale behind permitting Night Flying on such aircrafts.

Bineesh EB
NAI (SE)
221680 -W



Feel like an Owl
At Dark Nights

HOW TO AVOID CFIT AT NIGHT

Lt Sandhya Chauhan
INAS 550

Controlled Flight Into Terrain (CFIT) is a major cause of aircraft accidents and it is not surprising that many of these happen at night. Night flying can offer some of the best experiences in the career of a pilot (less traffic, generally smoother air, fewer storms). It also presents challenges that can make it more dangerous. Innovations like Enhanced Flight Visual Systems (EFVS), Synthetic Vision Systems (SVS), and Night Vision Goggles (NVG) may one day eliminate the threat of unseen terrain or obstacles, but they might take some time to become widely available around the world.

In the mean time, how can these accidents be avoided? Planning and preparation are the best defences. Taking some time to get familiarized with the sortie profile and terrain over which operations will be carried out is worth an investment. The following tips to avoid accidents due to CFIT may be useful:-

- Terrain familiarization is critical for safe operations at night. Use area charts or other topographical references to ensure that altitude at which aircraft flies safely clears terrain and obstructions all along the route.
- When planning a night VFR flight, follow IFR practices, such as climbing on a known safe course until well above surrounding terrain. Choose a cruising altitude that provides a terrain separation similar to IFR flights

(2000 ft AGL over mountainous areas and 1000 ft AGL in other areas).

- When receiving radar services, do not depend on air traffic controllers to warn you of terrain hazards. Although controllers will try to warn pilots but they may not always be able to recognize that a particular VFR flight is dangerously close to terrain.
- When ATC issues a heading along with an instruction “maintain VFR”, be aware that heading may not provide adequate terrain clearance. If you have any doubt about your ability to visually avoid terrain and obstacles, advise ATC immediately and take action to reach a safe altitude.
- For improved night vision, use of supplement oxygen is recommended for aircraft operating above 10,000 ft.
- If you fly at night, especially at remote and unlit areas, consider GPS-based terrain awareness unit to enhance safety at night.

Fly Navy, Fly Safe...

Author Lt Sandhya Chauhan was commissioned in to Indian Navy on 04 Jan 2010. She was awarded wings on 04 Jul 2011. The officer is presently appointed as Staff Observer of INAS 550 and has a total flying experience of 750 Hrs.

“HIDDEN FACTS”

10 MOST COMMON HUMAN FACTORS THAT CAUSE ACCIDENTS

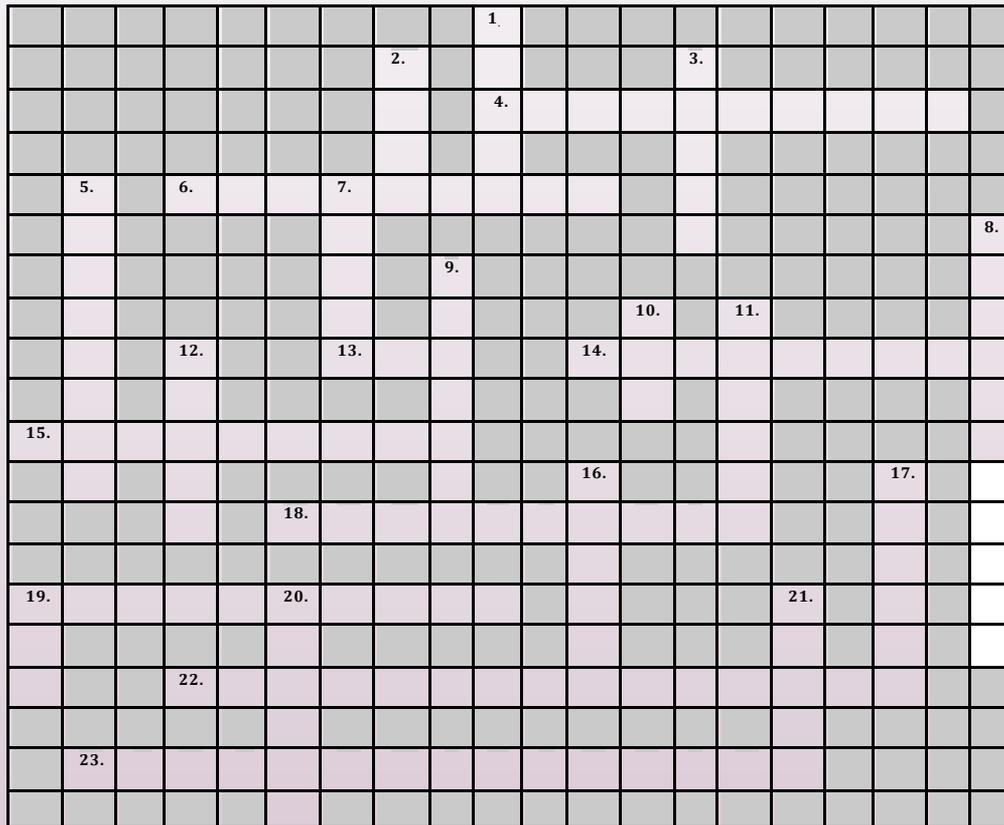
Deepak Kumar Pal LA (SE)
INS Airavat

1. **HASTY DECISION.** Acting before thinking can lead people to take hazardous “Shortcuts” in flying.
2. **INDIFFERENCE.** A lack of attention in the cockpit; not alert; daydreaming.
3. **DISTRACTIONS.** Interruptions by others, perhaps caused by family troubles, bad news and horseplay while someone performs normal duties or non-routine hazardous tasks.
4. **DEPRIVED WORK HABITS.** Cluttered hangar/work areas, improper tool control, FOD, etc.
5. **EXPOSED INSTRUCTIONS.** Result in an untrained or improperly trained tradesman.
6. **NEGLIGENCE.** Failure to observe basic flight safety norms or failure to follow proper maintenance instructions.
7. **FLAW IN PLANNING.** Two or more supervisors, each depending on the other to supervise, and it doesn't get done.
8. **ARROGANCE:** Displayed by behavior of the aircrew that is too cocky, risk taking, and macho.
9. **CURIOSITY.** Men do something unexpected just to see what will happen.
10. **TEMPER.** Causes a person to become irrational and disregard common sense.

THE NIGHT PUZZLE

Lt Cdr Krishanu De
INAS 336

So you thought you could quote authority related to night flying? Here is a brain teaser to test your knowledge of night flying related trivia from our bible. Let's see if you can get it right without any over-writing or use of whitener!



Across:-

4. Any fixed wing aircraft or helicopter, which has completed a scheduled _____ or has been worked on consequent to a defect is not to be detailed for night flying without an NFT. (10)

6. Where electrical airfield lighting is not available, _____ flares are to be laid for lighting

the runway during night flying. Taxiway lights are to be provided by glim lamps. (9)

13. The standard abbreviation used in monthly flying returns in respect of night flying is _____. (3)

14. _____ traffic during night flying is to observe a speed limit of 40 Kmph. (9)

15. Night flying criteria for award/renewal of _____ for flight engineers/signalers and gunners is 60 hrs by night on all types. (8,1)

18. One of the criteria before carrying out night deck landing is that pilots are normally to have completed at least _____ deck landings by day on the mark of aircraft concerned. (6, 4)

19. Twin engine fixed wing aircraft (other than twin engine fighters) must have flown at least one sortie by day or night in the preceding _____ hours prior to night flying, failing which an NFT is required. (7, 3)

22. Whenever, an aircraft has been declared serviceable after a _____, it shall not be required to fly a separate NFT on the same day. (5, 4, 6)

23. It is mandatory for single engine fixed wing aircraft, twin engine fighter aircraft and all helicopters detailed for night flying to fly at least one sortie during the last 24 hrs failing which an _____ is required. (5, 6, 4)

Down:-

1. No naval pilot is to fly any aircraft or helicopter solo or 1st pilot by night unless he holds a valid _____ instrument rating. (5)

2. A naval pilot is not cleared to carry passengers by night unless he has flown at least _____ hours solo/first pilot by night and is authorised by the Captain', in writing. (4)

3. Single engine aircraft on _____ missions (except disembarkation and embarkation of ship flight within local flying area of the air station) and

multiengine aircraft on ferry mission prior /post overhaul at foreign airfield are to be planned to land at least 45 minutes before the local sunset. (5)

5. The _____ Pilot detailed for night flying should have flown one sortie during preceding 96 hours. (8)

7. Aircrew of twin and multi-engine aircraft/helicopters must have flown at least one sortie by day on type in the _____ days preceding night flying. (5)

8. The requirement of NFT for crew as well as aircraft may be waived off by AA/ OTC in cases of urgent requirement of lifesaving and _____ missions. (11)

9. For twin and multi-engine fixed wing aircraft (other than fighters) and helicopters taking off 30 minutes or earlier, prior to sunset, the requirement of NFT may be waived off, but is to be specifically authorised by the Cdr (Air) or _____. (7)

10. Night flying is to be recorded in _____ ink in the squadron authorization book. (3)

11. It is desirable that aircrew scheduled for night flying in a _____ engine aircraft/ helicopter carry out at least one sortie by day on type. (6)

12. Night flying criteria for award of _____ instrument rating for helicopters is 25 hrs 1st pilot by night and for A/B MG is 50 hrs 1st pilot by night. (5)

16. All flights terminating _____ (anchorage, alongside, underway), the day flying shall be planned from sunrise to sunset. (6)

17. NFT is to be completed prior to _____ and must consist of an airborne time of at least 20 minutes. (6)

Puzzle

19. During pre flight medical examination, it is to be ensured that aircrew has had adequate rest (sleep) in the preceding _____ hours of night flying. (3)

20. One of the conditions of moon phase is that

the moon is _____ degree above the horizon. (6)

21. All flying carried out from 20 minutes after sunset to 20 min before sunrise is termed as _____ flying. (5)

For solutions turn to page: 54

Author Lt Cdr Krishanu De is a Qualified Flying Instructor with 3000 hours of flying experience. The officer is presently posted to INAS 336 as Staff QFI.



HR Page

Ab-initio Flying Training of IN Officers

MoD has accorded 'in-principle' approval for undertaking training of additional IN officers @ 10 trainees every six months at IGRUA commencing Jul 2014 till 2017, under delegated powers. Based on the above, VCNS sanction was obtained and contract has been signed between DNAS and IGRUA on 23 Jun 14. This would increase the ab-initio training intake to 27 trainees every six months including 17 trainees at Air Force Academy and 10 trainees at IGRUA.

Training of IN Fighter Stream Pilots

Initially IN had trained 40 pilots with the USN. Further, a contract for 24 more pilots was signed. The second batch of four IN officers for this 2nd contract were deputed to USA for fighter training under Foreign Military Sales training program w.e.f 09 Apr 14. Accordingly, a total of eight IN officers (in two batches) are currently undergoing fighter training with USN. Further, Cdr YH Karkare (04032-N) has been selected as Training Control Officer (TCO) to monitor the fighter training of IN officers with USN. Case for MoD approval for deputation of TCO w.e.f 01 Aug 14 is being progressed.

Simulator Training for P-8I Crew

An RFI was hosted on MoD website in Apr 14 for undertaking Boeing 737 simulator training for IN pilots from P8I stream, at civil facilities within the country,

pending induction of our own Boeing P-8I simulator. Responses have been received from vendors on the RFI and the case is now being progressed further.

Screening Test for 38th Flight Test Course

As per modified procedure of shortlisting candidates for screening test of Flight Test Course, volunteers have been sought through IGs for the next FTC / FTE/ FTE (Av)/ FTIE course commencing in Jun 15 at ASTE, Bangalore. Based on flying merit and stipulated QRs the following seven aircrew have been shortlisted to undergo screening test for 38th FTC at AFTPS, Bengaluru in Sep 14:-

- | | |
|------------------------------------|-------------|
| (a) Lt Cdr Vivek Kumar (05378-Y) | INAS 300 |
| (b) Lt Cdr Arvind Nair (05553-W) | AFA |
| (c) Lt Cdr AC Nikam (05845-H) | INAS 312 |
| (d) Lt Cdr Vinay Joshi (06010-H) | INAS 311 |
| (e) Lt Cdr B Madhukiran (05508-T) | 321 (V Flt) |
| (f) Lt Cdr PJR Chaitanya (05573-R) | Teg Flt |
| (g) Lt Cdr S S Patil (05724-H) | INAS 300 |

Induction of Sailors as UAV Operators

A pilot project for induction of sailors as UAV payload operators has been initiated, wherein four

sailors (EAAR3) have been deputed to INAS 342 for training in Apr 14. If successful, this would pave the way for induction of additional sailors and alleviate shortages being experienced in the UAV stream.

Good Performance by IN Officers

- The 60th Flight Safety and Accident Investigation Course was scheduled at the Institute of Flight Safety, Palam from 20 Jan till 28 Feb 14. The course included 30 officers from IAF, Army, IN, ICG

and HAL including 03 officers from friendly foreign countries viz Afghanistan, Malaysia and Indonesia. Cdr Renson Jose (04492-H) scored 80.93% marks in the course and stood **First in the Overall Order of Merit.**

- Cdr Vinod G Menon (03606-W) stood second (overall) in the 16th Basic Imagery Interpretation Course for Officers at Photo Interpretation School conducted by IAF. He was also awarded the **'HQSAC trophy for Best Photo Analyst'** on 28 Mar 14.

Change of Nomenclature of Courses for Air Handler Trade

Competent Authority has approved change of nomenclature of courses for AH trade sailors as follows:-

Present Nomenclature

Basic Motor Transport Driver (BMTD)

Advanced Motor Transport Driver (AMTD)

New Nomenclature

Basic Aviation Vehicle Operator (BAVO) Course

Specialist Aviation Vehicle Operator (SAVO) Course

Authy:- IHQ MoD(N)/DNT letter TR/3114/Navy/AVN/C dt 21 Apr 14.

"There I was, fog was so thick I couldn't see the instruments. Only way I knew I was inverted was my flying medals were in my eyes. But I knew I was really in trouble when the tower called me and told me to climb and maintain field elevation."

— Anonymous



Night Operation ball game a



Play it, But P

ns is a different
altogether...



Play it Safe !!

Cdr Dhanunjay Rao, INAS 339



KEY FACTOR TOWARDS SAFE NIGHT OPERATIONS

Lt Cdr Raj Kishore
INAS 561

*I*n my younger days, my dad, who himself is an educationist used to stress upon a saying “Work hard now or you’ll have to work harder later”. I never realized the importance of these words until I had to burn the midnight oil, at the last moment, to get through my exams. I wish I could have studied in time. Well that is on a lighter note. However, with a few years of experience as a rotary QFI, I realized that in addition to the “work hard” factor, approach towards aviation training needs to be judicious, relentless and recurrent. It’s all about preparation, paying attention to all the small details and **taking training seriously**, whether it is spending time in the simulator, running through the checklist or reading through a flight manual. This significantly increases the odds of safely handling an emergency.

Before I bring out the main issue of my article related to training in aviation industry, it would be necessary to share a small incident which proved to be an eye opener in my limited aviation career.

“Come up...come up...” and before I could react to these loud calls on intercom, splashes of water on the windshield of the aircraft painted the real picture of danger. Despite the most powerful set of contra-rotating rotors at maximum speed, the only thing I could hear in the cockpit was the subtle sound of my only companion, my able observer. Sooner did I realize that we were about to be engulfed in the ruffling wake of the ship just a few meters behind the deck, I blindly followed his advice and came up on the collective.

This event occurred during one of the night DLP sorties on a KM-31 aircraft. While making the finals approach on to the deck, not only did I miss the check of GPI on short finals but was also disoriented. I looked around just in time to realize that there was none to whom I could hand over the controls and get rid of the awful situation. While I was scanning for the knight in shining armor, I happened to get hold of the GPI indicating red. It was enough to tickle the rightful thought wherein I automatically started taking all the necessary actions for a safe go around.

Well the next approach and landing was more pleasant than I thought but it did leave us with a thought to ponder over for a long time. I tried to recollect as to what actually happened after I saw the GPI indication red, whilst I was in the melee of the poor and unsafe approach. And I realized what it wasTRAINING. The repetitiveness of the go around actions, with full alacrity every time, practiced during my training phase of DLPs whilst the GPI indication is red was a kind of reflex that occurred at that critical moment. The actions were so deeply embedded in my mind that there was no pause in actions from the time I saw red on GPI.

“Excellence is an art won by training and habituation. We do not act rightly because we have virtue or excellence, but we rather have those because we have acted rightly. We are what we repeatedly do. Excellence, then, is not an act but a habit.”

--- Aristotle

Training

What actually is training? One of the common definitions is “the action of teaching a person or animal a particular skill or type of behavior”. What constitutes training? How is the connection between teaching and training? The term “teaching” means cultivation of habits, practicing and exercises that develop the capabilities necessary to master a particular profession. The term “training” is somewhat broader in meaning and is considered to be synonym for the concept of “change of behavior.”

“The purpose of training is to cultivate definite behavior patterns in crew members before they are given the responsibility to fulfill their functions in everyday operations and to change these patterns consistent with demands of particular conditions and with the information available for decision making”

One of the examples we can pick up from our day to day operations is the pattern of re-familiarization post break in flying. The laid down syllabus for night re-fam of Chetak aircraft is 01:30 hrs including one sortie for emergencies (post day re-fam). At times, pilots come back to flying after a break in flying for more than 02-03 years. Re-fam syllabus is the clearance for an individual to fly as first pilot. The pilot may have enormous past experience to fly the aircraft but the point to ponder is “Whether he is capable of handling all the aircraft emergencies with 01:30 hrs of re-fam sorties”. Again we come to the same concept of “Change of behavior” Or “Cultivate definite behavior patterns”. Has the pilot been trained enough to take a split second action/ decision as far as emergencies are concerned. It would rather be more beneficial if the individual is initially cleared for co-pilot duties post re-fam for few hours (depending upon the type of aircraft) and then be cleared to carry out independent missions as first pilot. These could be more relevant to aircrew coming from a different aircraft wherein he needs to change his behavioral pattern suiting to

the new machine. These additional co-pilot hours will surely help the individual in obtaining better standards as far as reaction time is concerned.

I used to wonder, well not now after having instructed few of them, why a trainee struggles so much in trying to maintain a steady hover whereas an experienced crew does not even bother about it, he is able to focus on R/T calls as well as does actions based on the mission. The answer lies in the fact that the control inputs which are required for hover (in case of an experienced crew) are taken care off by his sub-conscious mind and thus his conscious mind is free to focus on other things. The subconscious mind stores all the previous life experiences, beliefs, memories, skills, and various other situations one has been through. The only thing that varies is the speed of reappearance of such memory which is purely based on the number of times the event has been repeated.

I would not deliberate much on the reflex actions like hitting a mosquito while sleeping at the right place or putting the turn indicator of the bike/ car before every turn despite being busy listening to music or chatting with pillion/ companion. All this was cleared during the school days and we are very much aware of the science behind it. What I wish to bring out through this article is that it is not because an individual has been taught how to use the indicator but because he has been doing it so often that this has become a second nature. Was it not my sub-conscious mind which took control of the situation to bring me out of the “GPI RED” situation?

The aim of successful aviation training is to fill this sub-conscious mind with so much of data that it is ready to take on any react situation keeping the conscious mind free to focus on the decision making and mission accomplishment.

Thus the point I wish to bring home to my readers is that the focus of training should not be restricted to a one time demonstration, but to repeatedly focus on such issues. All the institutions/ organizations/ individuals should appreciate that “we are best at what we repeatedly do”. The repeated practices will assist the aircrew in achieving safe operations and also increase situational awareness. Situational awareness is all about visualizing what you may not see and especially at night when you do not see much. The clue available to individual during night operations are fewer and thus we must aim to recover from any given situation based on these limited clues. An individual with repeated practice will be better in handling an untoward situation than

a well learned person who has greater theoretical knowledge (definitely I don't want to take the credit from those who fall in the second group).

Murphy's Law ensures that accidents will continue to happen despite our best efforts and safe practices, and for that reason, no one should feel that he is “fully trained” on a particular subject, because there's always more to learn and ways to sharpen skills.

Author Lt Cdr Raj Kishore is an alumnus of 104 NDA course. He is a fully ops Chetak and KM 31 pilot. He is presently posted in INAS 561, HTS as Staff QFI.



Weatherwise by Night

Dy Comdt Atul Agarwal
INAS 561

*W*e say that night flying is an intelligent combination of visual and instrument flying. But all aviators, specially the helicopter pilots, will agree with me that it takes more than this combination to operate safely during night. Ashore or afloat, the game generally remains the same for an experienced pilot. The pre-requisites for the safe conduct of night operations never change. The pre-flight briefing including met briefing, adequate rest and last but not the least pre flight meals are an integral part of safe night flying ops. Though experience does matter one cannot (and should not even attempt “trust me”) take the weather report by night casually. Well I did use the word casually to reassure the readers that as military aviators we tend to take it casually until the ‘D’ day teaches us the great lesson.

After getting the Q code for “Instructing”, my confidence level was as high as it could have reached. Further, I was about to get Clearance to Instruct by night on Chetak after a sortie with the Commanding Officer. On that particular night I was planned for flying with an experienced QFI. The captain of the aircraft was an old hand and one of the most experienced in the squadron. There were three other aircraft flying that night, and the entire staff of QFIs were in air that night, including the Commanding Officer.

Prior to the sortie briefing, the weatherman had reported possibility of gusting winds within an hour. We assumed “not something to be much worried about”, as flying was restricted to circuits only. The sortie was uneventful for the first 20 minutes and we got involved in con training and circuit flying aiming for accuracy that could be achieved (more so for a QFI). As the sortie progressed, the concept of giving offset into winds and balanced flying was put to test with every landing. The deep involvement in achieving a zero-zero approach with no drift was testing our skills. In this melee we heard a call from ATC issuing a weather warning for gusty winds and heavy shower approaching the runway. But the mighty instructors (love being called next to God) took a call and decided to continue till weather approached closer.

However during a demo approach and the patter of my co-pilot we realized that though the indicated speed was reducing, the ground speed was increasing. This would have made us happier during long ferries but it was not the case that night. The aircraft by now started misbehaving and the easiest task of maintaining the centerline and glide path seemed the most difficult maneuver ever. This ordeal was further prolonged by the unnatural death of all the goose necks indicating the flare path. The aircraft

with reduced forward speed was becoming more and more difficult to control and it seemed as if the aircraft controls were being taken over by nature. The decision was instantaneous and my copilot immediately shifted to dispersal and wasted no time in switching off and ordering the ground crew to shift the aircraft inside. Meanwhile we heard the other aircraft too deciding to rejoin and struggling to make good a steady hover. Three aircraft trying to make good a single helipad one after the other to get the aircraft on ground was a scene that no crew would like to experience. And then hit Murphy causing total power failure of the flare path. Though the emergency system took over on time, the gap of few seconds at that time seemed longer than an hour. By the time we entered the hangar with our aircraft the wrath of the winds and heavy shower coupled with complete darkness forced the other three aircraft to switch off on the helipad. A highly commendable decision that deserved applause but the crew needed none. The entire team was inside the hangar in no time assisting the ground crew in getting the aircraft inside the hangar. The entire event of shifting the aircraft into the hangar under such circumstances would have given the team high marks in any FSI or inspection. Well the credit goes to the team work involving the entire squadron.

Although nothing happened that could have lead to an embarrassment, there was a lot to learn from that night:-

- Weather by night is more deceptive than day and needs more seriousness as we cannot discern clouds unless they expose themselves with shower.
- Must cater for power failures and loss of sudden visual cues. Hence one needs to have various references marked that can lead to a safe return especially in VFR flights.
- Weather does not differentiate between senior/ junior, experienced/inexperienced and QFI/pupil. Let's respect it.
- The advice of a weather man (Met Officer) needs to be taken into account and evaluated with time to cross check.
- Though that was not my first encounter with weather (and not the last) it did remind me of my instructor who said "The aim is not to fly an accurate sortie and complete the mission, but to come back and have tea peacefully".

Author Deputy Commandant Atul Agarwal is a qualified ALH and Chetak Pilot. He is presently posted in INAS 561, HTS as Staff QFI.

*Flight Safety! Flight Safety!
Words are small meaning is hefty;
Various departments' unity,
Ensures Flight Safety;*

Mukesh Kumar Chaubey, Class – X
Kendriya Vidyalaya, INS Rajali, Arakkonam

From the FS Files

Introduction

In today's complex world of GPS, glass cockpits, and flight management systems, sometimes a simple rule of thumb or memory aid is still the best way for a pilot to avoid an accident. I think "N.I.G.H.T." is one such mnemonic pilots should use before every night flight. Night flight has certain inherent risks. The five most important questions a pilot can ask or review before a night flight are contained in the acronym N.I.G.H.T. Each letter asks a question or relates to a topic that a pilot should consider before every night flight. The five simple letters stand for five critical issues that address important operational issues, potential hazards, or physical limitations - topics unique to night flight.

NOTAMS – Have I Checked Local NOTAMs?

When it comes to NOTAMs, you don't know what you don't know! Every prudent pilot obtains a full briefing from the Station ATC to ensure that he has all the information necessary to conduct a safe flight. An important part of that briefing will be NOTAMs. If the flight is to a distant airport, the NOTAMs received will typically include information on navigational facilities, frequency changes, and regulatory amendments. But it is important to obtain information such as runway or taxiway closures and airport lighting outages. A total or partial outage of a Visual Approach Slope Indicator (VASI) or Runway End Identifier Lights (REIL) system can at times prove critical at the destination. The best thing to do is call the airport manager/ ATC.

Illusions - Have I Considered Them?

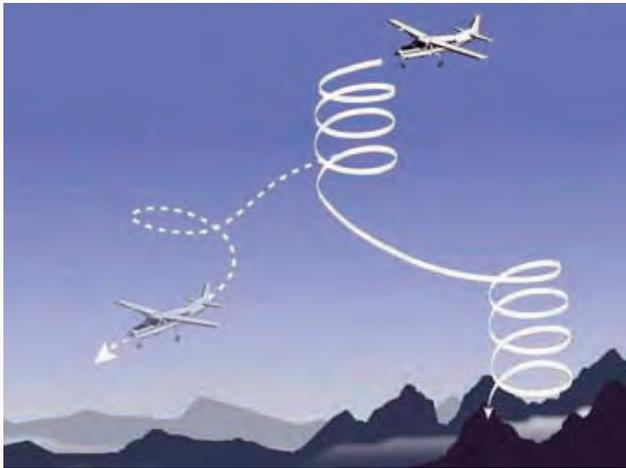
Many different illusions can be experienced in flight; some can lead to spatial disorientation while others can lead to landing errors. Illusions rank among the most common factors cited as contributing to fatal accidents.

➤ Illusions Leading to Spatial Disorientation.

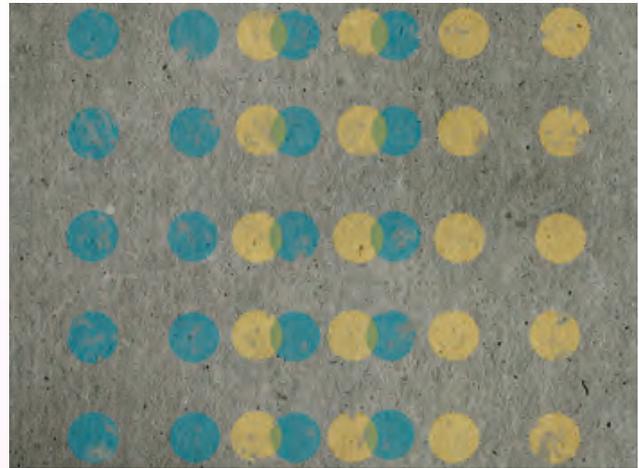
Various complex motions and forces and certain visual scenes encountered in flight can create illusions of motion and position. Spatial disorientation from these illusions can be prevented only by visual reference to reliable, fixed points on the ground or to flight instruments. Refer to Aviation Medical Specialist for better understanding of the illusions such as:-



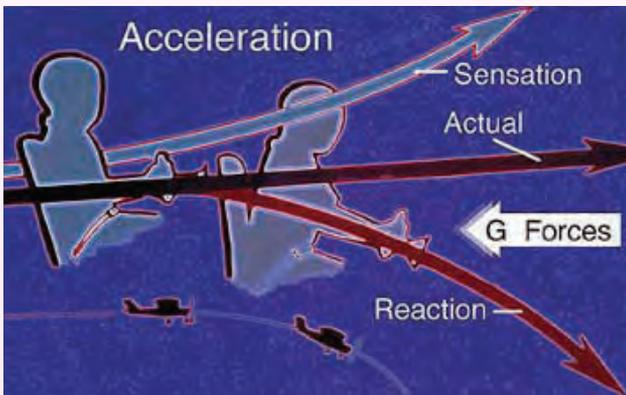
◆ Coriolis illusion



◆ Graveyard spiral



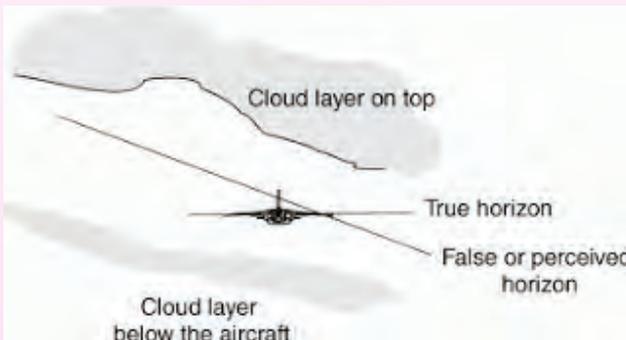
◆ Autokinesis



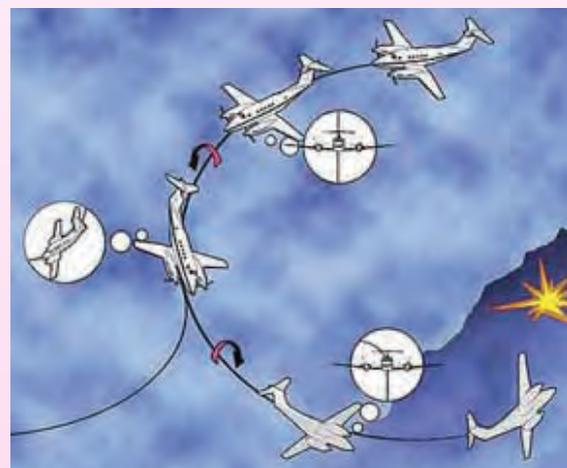
◆ Somatogravic illusion



◆ Elevator illusion



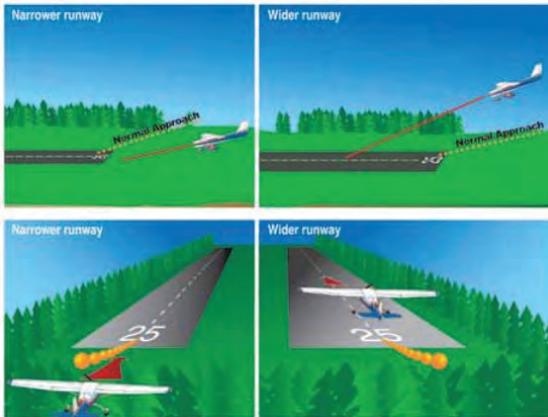
◆ False horizon



◆ Inversion illusion

➤ **Illusions Leading to Landing Errors.** Various surface features and atmospheric conditions encountered in landing can create illusions of incorrect height above and distance from the runway threshold. Landing errors from these illusions can be prevented by anticipating them during approaches and by using an electronic glide slope or VASI system when available. The most common illusions leading to landing errors are:-

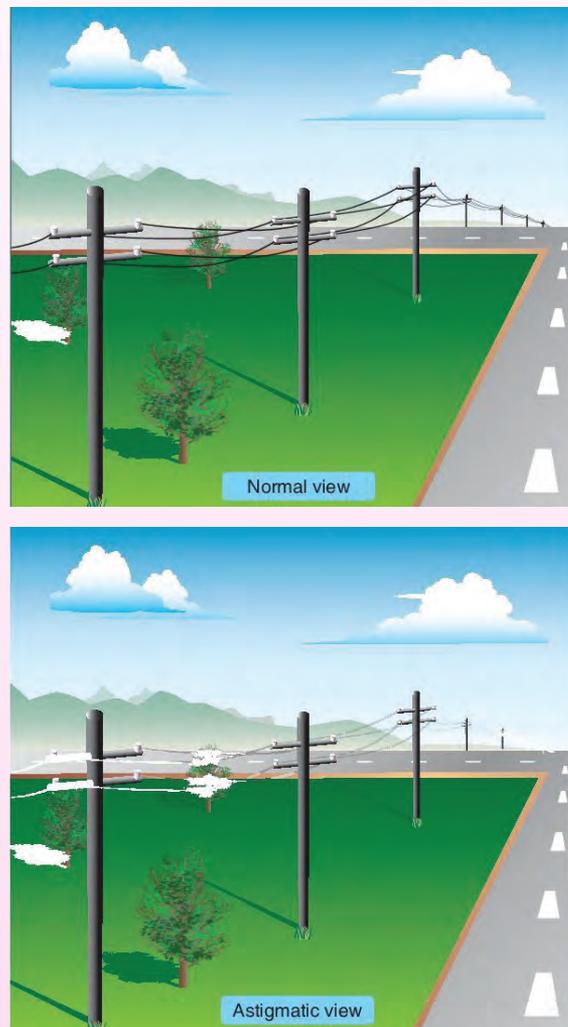
◆ Runway width illusion. A narrower than usual runway can create the illusion that the aircraft is at a higher altitude than it actually is. The pilot who does not recognize this illusion will likely fly a lower approach, with the risk of striking objects along the approach path or landing short. A wider than usual runway can have the opposite effect, with the risk of overshooting the runway.



◆ Runway and terrain slopes illusion. An up-sloping runway, up-sloping terrain, or both, can create the illusion that the aircraft is at a higher altitude than it actually is. The pilot who does not recognize this illusion will actually fly a lower than normal approach. A down-sloping runway, down-sloping approach terrain, or both, can have the opposite effect.

◆ Featureless terrain illusion. An absence of ground features, as when landing over water, darkened areas, and terrain made featureless by snow, can create the illusion that the aircraft is at a higher altitude than it actually is. The pilot who does not recognize this illusion will fly a lower approach.

◆ Atmospheric illusions. Rain on the windscreen can create the illusion of greater height, and atmospheric haze can create the illusion of being at a greater distance from the runway.



◆ Ground lighting illusions. Bright runway and approach light systems, especially when few lights illuminate the surrounding terrain, may cause the illusion of less distance from the runway. A pilot who does not recognize this will fly a higher approach. Conversely, the pilot over-flying terrain which has few lights to provide height cues may make a lower than normal approach.

Glideslope - Is One Available?

Check to see if a visual or electronic glide slope is available before departing to your destination. Although visual glide slope indicators are installed at most airports, it is important to note that they may be installed at only one runway end. Also, there are many variations. Some of the not-so-common indicators include the Tricolor System, Pulsating System, Alignment of Element System, and the Three-bar VASI.

➤ Tri-color System (Akin to GPI on Ships). Tri-color visual approach slope indicators normally consist of a single light unit projecting a three-color visual approach path into the final approach area of the runway upon which the indicator is installed. The below glide path indication is red, the above glide path indication is amber, and the on glide path indicator is green. These types of indicators have a useful range of approximately one-half to one mile during the day and up to five miles at night.

➤ Note: Since the tri-color VASI consists of a single light source which could possibly be confused with other light sources, pilots should exercise care to properly locate and identify the light signal.

➤ Pulsating Systems. Pulsating visual approach slope indicators normally consist of a single light unit projecting a two color visual approach into the final approach area of the runway upon which the indicator is installed. The on-glide path indication is a steady white light. The slightly below-glide path indication is a steady red light. If the aircraft descends further below the glide path, the red light starts to pulsate. The above glide path is a pulsating white light. The pulsating rate increases, as the aircraft gets further above or below the desired glide slope. The useful range of this system is about four miles during the day and up to ten miles at night.

➤ Alignment of Element Systems. Alignment of elements systems are installed on some small general aviation airports and are a low-cost system consisting of painted panels, normally black, white or fluorescent orange. Some of these are lighted for night use. The useful range of these systems is about three-quarters of a mile.

➤ Three-bar VASI. Three bar VASI installations provide two visual glide paths. The lower glide path is normally set at three degrees while the upper glide path, provided by the middle and far bars, is normally 1/4 degree higher. The higher glide path is intended for use only by high cockpit aircraft (Boeing 747, DC10 etc.) to provide a sufficient threshold crossing height.

Note: Although normal glide path angles are three degrees, angles at some locations may be as high as 4.5 degrees to give proper obstacle clearance. Pilots of high performance aircraft are cautioned that use of VASI angles in excess of 3.5 degrees may cause an increase in runway length required for landing and rollout.

How Do I Control Lighting Systems?

Operation of airport lighting systems (rotating beacons, approach lights, VASI, REIL, taxiway lights and runway lights) may be controlled by the control tower, Flight Service Station (FSS) or by the pilot with radio control. On runways with both approach lighting and runway lighting (runway edge lights, taxiway lights, etc.) systems, the approach lighting system takes precedence for air to ground radio control over the runway lighting system.

Terrain - How Do I Avoid It?

Avoiding terrain at night is easier if altitudes shown on VFR and IFR charts are used as part of preflight planning.

- VFR Charts show Maximum Elevation Figures (MEFs). The Maximum Elevation Figures shown in quadrangles bounded by ticked lines of latitude and longitude are represented in THOUSANDS and HUNDREDS of feet above mean sea level. MEFs are determined by rounding the

highest known elevation within the quadrangle, including terrain and obstruction (trees, towers, antennas, etc) to the next 100 foot level. These altitudes are then adjusted upward between 100 to 300 feet. Recognize that this practice could give as little as 101 feet of obstacle clearance.

- IFR Enroute low altitude charts contain Off Route Obstruction Clearance Altitudes (OROCA). On the IFR enroute low altitude chart, the Off Route Obstruction Clearance Altitude (OROCA) guarantees 1,000 foot obstacle clearance in non-mountainous terrain and can be used at night to ensure obstacle clearance. In mountainous terrain, this altitude offers 2,000 feet of obstacle clearance.

Editors Note.

The above article has been adapted from an article written by Adrian A. Eichhorn who is a 7,000-hour pilot and had formerly worked for the FAA. The relevance of the article was striking and reflected the experience of a wise aviator.





**FLIGHT
SAFETY
BEGINS FROM
GROUND**

NIGHT VISION - DEMYSTIFIED



Cdr Wingston Mathews T
INS Garuda

Believe it !! We do not see with our eyes. Our eyes are the most technologically advanced cameras which nature has specifically developed over millennia of evolution, complete with touch sensitive eyelashes on its gesture operated lens shutters, eyebrows which redirect salty sweat flow to the side of the eyes, automatic shutter speed and aperture control, adaptive lens and a light sensitive self adjusting film called retina. Notwithstanding all that, the picture is printed inside our brain in 3D.

Human Eye Camera Specification. Our eyes have a field of view (FOV) of 188 degrees in azimuth and 135 degrees in elevation. Amazingly our eyes work over a very wide light intensity range of 1:1,000,000,000 where if 1 is the minimum light intensity then the maximum intensity will be one billion times more. Light measured in Candela per square meter for sun is 100000, indoor electric light is 100, moon is 0.1 and star is 0.001. Yet, our eyes work very well in conditions ranging from an overcast dark night to the brightest possible sunny noon with clear sky. A pixel subtends 0.3 arc minutes in the eye. So each eye gives $(188 \times 135) / (0.3 \times 0.3) = 275\text{MP}$. Thus the picture formed in our brain is 550 Mega Pixel. No man made camera has ever matched these specifications.

Depth Perception. The images from our eyes are sent to the brain which continuously keeps processing

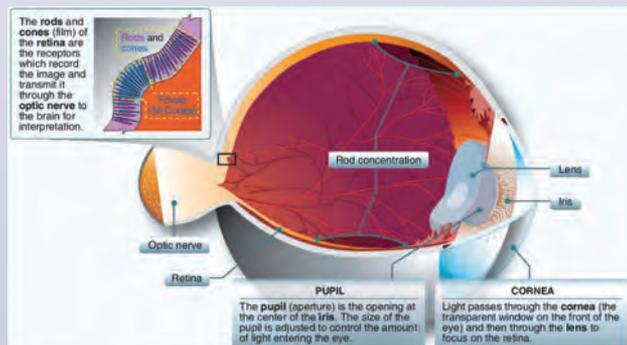
the two streams of electrical signals arriving from the eyes, converting them into 2D images and 3D videos. Both the eyes are unique and independent. The brain can process data from either one or both the eyes. If one data is cut off we lose depth perception or 3D which is OK for all practical purposes, as depth perception is lost at a distance of about 9 meters from our eyes. Beyond 9 meters our brain falls back on previous experience, uses the intensity of light and shadows and also compares size and shape of known objects in the FOV to give us depth perception of the target we are looking at.

Visual Spectrum. Our eyes can see only visual spectrum between 380 to 760 nm (nanometer) wavelengths. All other radiations below Infrared (IR) and above Ultraviolet (UV) spectrum can damage the retina. The IR waves have less energy and are thus less damaging to the retina compared to UV rays. Hence IR/Thermal cameras are widely used to see through smoke and darkness.

Lens and Pupil. Each eye has a lens that focuses image on a spherical retina with cones and rods. The aperture of the pupil changes continuously to control the quantity of photons entering the eyes to maintain within the contrast window of 1:1000. The aperture of the eye varies from 8 mm to 1.5 mm with 30 times more photons entering the eye compared to those

entering at its minimum aperture. The lens focuses and amplifies light 1, 00,000 times before it falls on the retina. So if the pupil does not control the amount of light entering the eyes continuously, then the lens will burn a hole in the retina. In low light conditions the pupil opens to let more light into the eyes for better quality of image signals. Our ability to operate pupils and lens degrades with age. We accelerate this process by getting glued to the computer/TV screen for long hours resulting in no exercise to the eye muscles. Remember to look away from the PC/TV for a few seconds once every three minutes.

Cones and Rods. We already know that Cones detect colour as well as light intensity. Rods detect only light intensity but not colour. Cones are less sensitive to light intensity compared to Rods. For every cone there are 17 rods present in our eye. There are 7 million Cones and over 94 million Rods in each eye. 64% Cones detect green light, 32% red and only 2% detect blue. The minimum light intensity detected by the Rods will have to be multiplied 1000



times before the Cones can detect it. The Rods are designed to help us see a target over an unlit terrain or sea in dark night conditions, if allowed to adapt to darkness for a few hours. But the Cones need at least 50% light intensity available on a full moon night to detect a target.

The Retina. The retina is like a camera film placed at the back of our eyes to capture the image focused

by the lens. There is 1.2 mm pit in the center called the fovea which subtends 0.6 deg vision at the lens center, where light is focused by the eye lens. About 50% of our optical nerves carry signals from this small area to give us the finest details corresponding to 20/20 vision in medical terms. The other 50% nerve fibers carry the rest of the low detail signals. The concentration of Cones reduces from fovea to periphery very fast and the concentration of Rods increase with distance from fovea exponentially reaching a maximum at about 17 degrees from fovea.

Day, Night, Twilight & Dusk. “Cones for day and Rods for night” is an incorrect statement. Although our eye has a wide operational min to max light intensity ratio of 1:1,000,000,000, it has a small window of working contrast ratio of 1:1000. This window is shifted as the day progresses from noon to dusk, dark night to twilight and back to noon again the next day. Evolution over millennia has ensured that our eyes work well in all conditions occurring naturally. Cones and Rods work well by day and Rods work exceedingly well in darkness. In twilight and dusk, both Cones and Rods function equally well at a reduced efficiency to give good vision and at the same time allowing time for Rods to adapt to fading light. So it is necessary to ensure that all our instrument/panel lights are turned to max brilliancy setting during dusk flying and turn them down gradually as the sun light fades and our eyes progressively adapt to darkness.

Night Adaptation - The Funda. Photo pigments convert light into electricity for Rods and Cones. Rods have Rhodopsin and Cones have three slightly different Opsins, probably one for each red, blue and green primary colour. The moment bright light falls on photo pigments, they get bleached or decay through an instantaneous chemical reaction. The opsins in Cones take just about 5 to 10 minutes to regenerate and reach their lower detection threshold. But the

rhodopsin in the Rods takes at least 30 minutes to regenerate to 80% of its lowest detection threshold. It may take about 50 minutes to reach 90% and many hours or even days to regenerate rhodopsin completely and reach the lower detection threshold of the Rods. More the time allowed for the Rods to adapt to the darkness, more are the electrical signals generated by the Rods for the same amount of photons, resulting in better target detection. At 100% adaptation achieved over 6 to 10 days, a rod can detect a single photon and our eye can detect a target with just 267 photons compared to over 4, 00,000 photons required at 80% adaptation

Aperture Adaptation. When we move from bright sunlight into a dark room, the eye opens its pupil allowing maximum photons to fall on the retina by dilating the pupils to its largest possible aperture of about 8 mm. Thus more Rods can generate weak signals which add up to give good signal strength for target detection. This is purely a mechanical adaptation. During World War, it was a common practice to use pupil dilating eye drops for better enemy target detection by lookouts starting from dusk to twilight. During a solar eclipse if we look at the sun with naked eye, the pupil opens wide in response to the low light condition letting in huge amounts of UV rays which can permanently burn our retina.

Neural Adaptation. Our brain has a trick for super fast night adaptation. It is called neural gain which happens in seconds when we go from bright light to darkness. Thus neural adaptation improves our night vision 10 times or more in a few seconds. When we enter a dark room coming from a bright sunny noon outside, we start seeing within a few seconds, thanks to neural gain.

Bright Light Kills Night Vision Instantaneously. Even if we adapt our eyes for night for one hour,

exposure to bright light for just 2 to 3 seconds is enough to decay rhodopsin. We have to start our night adaptation all over again to regenerate rhodopsin which is a painfully slow process. If bright light is unavoidable, then ensure that we protect one eye from bright light as each eye works independently. We lose depth perception when our brain receives signals from only one eye. By night and beyond 9 meters there is no stereoscopic 3D perception. Our brain uses previous experience, target size comparison and motion detection to provide we with depth perception.

Physical Blind Spot. The area where all the optical nerve fibers bundle into a confluence and leave the retina has no Cones or Rods. Thus we have a permanent blind spot over this area both by day and by night. But each eye has this blind spot on opposite sides of fovea closer to our nose and thus we do not feel it normally either by day or by night.



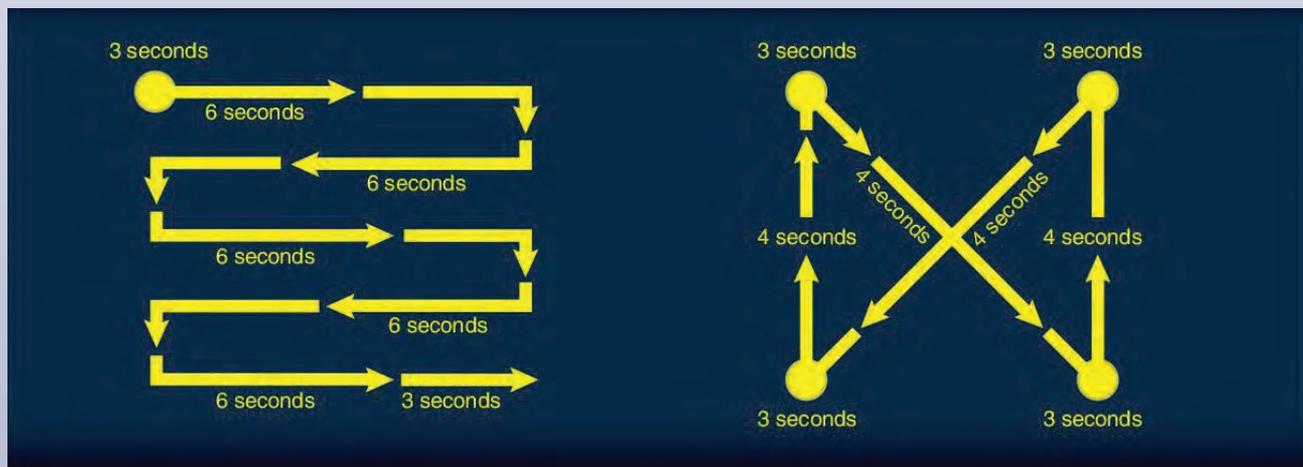
Two Blind Spots Exist By Night. Since the lens continues to focus the available light on to the cone in fovea where no Rods are available, we will not see anything in that spot by night. All the vision by night is outside this 1.2 mm diameter area. The same fovea which helped to get excellent detailed vision by day is now a blind spot, reducing our visual acuity to less than 20/200. This virtual blind spot happens only at night and is in addition to the physical blind spot already existing in our eyes. Thus we have two blind spots to deal with at night.

How to Avoid All Blind Spots at Night. In a dark night if we look directly at a distant target, we will not see it because the lens concentrates all the light received in a cone of 0.6 degrees view angle on fovea without a single Rod in it. The maximum amount of Rods are concentrated about 17 degrees away from

this 1.2 mm foveal or central blind spot. So we should look about 15 to 20 degrees off the target. If we look left or right of the target, then it is very likely that the target falls on the physical blind spot of at least one of the two eyes. So it is recommended that we look 15 to 20 degrees above or below the target so that targets do not fall on any of the blinds spots.

Night Blindness. Night blindness is unusual but can happen in a normal person due to long term Vitamin A deficiency caused by starvation, alcoholism, deficient fat absorption, liver related diseases etc. Our eye's retina condition can also cause night blindness due to glaucoma, drug toxicity and may even be hereditary.

Why Red Light for Night Adaptation. The rods cannot see colours. But the intensity of coloured light affects the rods differently. The rods are almost



insensitive to light waves in the red range above 640 nm. Thus during night adaptation if we need to see, then use only red light. Unfortunately, the lens focuses red light which has longer wavelength than green and blue lights, behind the retina. This means that the eye has to now use a focal length lesser than object distance from the eye to get a sharp image. Older crew, whose pupil and lens have already started narrowing in the operating ranges, may have to use dim white light instead of red light.

Why Greenish Yellow NVG Cockpit Backlights.

Look at a green light and a red light placed next to each other. The red light looks brighter. Now look 20 degrees above the light. In peripheral vision the green light looks brighter. This is because the Cones are more sensitive to yellow green light with 555 nm wavelength than red light. This explains why propeller tips are painted yellow. Rods are more sensitive to blue green light in the 505 nm wavelength and not sensitive to red light. When we look straight at the light, the image falls on the foveal area without any Rods and so the Cones distinguish the red light bright. Rods cannot decipher the colour of light falling on it. But each colour provides a different light intensity to Rods. Thus the green light looked brighter than red light which lies above 640 nm wavelength. This explains why the NVG compatible cockpits have yellow green back lights.

What is Contrast Discrimination? If We enter the sortie in the author book with red ink under white light and take it to the ship's Captain in the bridge where only red lights are on, most probably the Captain will ask to come back after filling all the columns before the signature column, because in red light he cannot see anything written in the author book page because the white page and letters in red ink have no contrast between them as both reflect only red light. The lack of contrast magically erases all that is filled in the

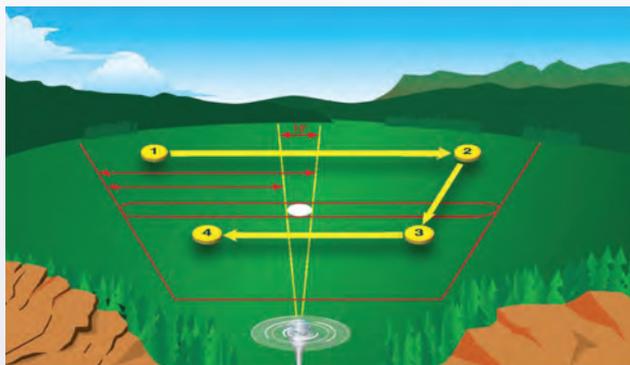
author book. Our eyes work on a contrast ratio of 1:1000. So, for better target detection with our eyes outside the cockpit at night, it is very important that we keep the instrument and cockpit illumination to as low as practically possible, reducing brilliancy as the night progresses so that our eyes adapt better to night vision.

White Ambient Cockpit Light At Night. Almost all the cockpit have multi coloured instrument markings as well as indicator needles and even knobs, buttons switches etc come in red, green, yellow and black colours. When the Cones are out of action at night, red light with high detection threshold is not of any help to see these coloured handles, switches, knobs and instrument markings. Thus dim white ambient lighting becomes a must in cockpit at night. Ensure that the dimmer rheostats work as designed before flying at night. Blind fold checks take utmost importance especially handling emergency at night.

What is Night Myopia? If we look out of cockpit into total darkness, our eyes have no target or anything else to focus on. This happens by day also when looking into a clear blue sky or into an overcast sky or a plain glassy sea. In these cases the eyes retain the focal length last used to view an object inside the cockpit. Thus we miss small targets, especially at night. The condition is worse if the windshield is dirty or has water droplets reflecting cockpit lighting on which the eyes get locked onto. So it is very important to clean the windshield before take off at night. After takeoff, if the rain or a bird decides to dirty the windshield, try using the windshield wiper.

How to Avoid Night Myopia. To avoid night myopia, clean the windshield, visor and glasses before night flying. Check if the windshield wipers work properly without leaving arcs on windshield. If there is a target visible far anywhere, then first look at it to get

the eyes break myopic focus. Practice a scan pattern outside the cockpit because nature designed our eyes



to catch the slightest motion of even a small target or light.

Exposure to Sun Delays and Slows Night Adaptation. A few seconds of bright light exposure decays all the rhodopsin we managed to regenerate in the rods sitting in the dark room for half an hour. That is only one part. A two hours exposure to bright sunlight during the day delays the onset of night adaptation by 10 minutes and the 80% night adaptation we would have normally achieved by sitting in darkness for 30 minutes will now take more than two hours. Sun exposure for 10 consecutive days reduces our visual acuity and visibility range as well as contrast discrimination by 50%.

Regaining Sun Exposed Vision. Our eyes have been designed well. We will regain what we lost in 10 days by keeping away from the sun for just one day. When we fly by day, always have our visor down. Wearing dark glasses that allow less than 15% light to pass through is the best protection. A pair of grey tinted photochromatic glasses that change to darker shade in response to UV light even during overcast sky are recommended.

Visual Illusions by Night. Even if we have slept well before night flying and completed our night

adaptation for hours, there are a few visual illusions like autokinetic illusion, DIP, black hole effect and other highly dangerous false perceptions which are confusing and disorienting. Many air crashes have been attributed to these effects.

➤ **Autokinetic Illusion.** Staring continuously at a fixed light or a star in darkness makes us believe that the light or star is moving. This is caused by the tiny fixation movements of the eye and loss of surrounding reference. Auto kinetic illusion happens even with two lights or stars. A third light or star not in the same line seems to remove this illusion. Many pilots have mistaken a bright star for a ship near the horizon in dark night over sea and flew towards it for a long time before realizing their mistake. The unlucky ones run out of diversion fuel.

➤ **Distance Illusion Phenomena (DIP).** Distance illusion happens when flying over unlit terrain or over sea in dark night. The No 2 keeps his leader's tail light on a fixed point on the canopy such that he is 2 nm behind and 300 feet below the leader. If the No 2 falls back to 4 nm whilst continuing to keep his leader on the same point on his canopy, then his aircraft is 600 feet below the leader. If the leader descends to 600 feet, then the No 2 impacts ground or water.

➤ **Black Hole Effect.** Black hole effect happens over unlit terrain and over sea at night when no horizon is visible. Worst case is when only the runway lights or the ship's deck lights are visible. No horizon and no visual cues from surrounding areas makes the pilot believe that his aircraft is stable but the runway is out of position or sloping down and ends up making unusually shallow undershooting approach and fatally impacting

ground well before the runway. This also explains why helicopter pilots find carrier deck approach to be more disorienting in dark night than a small deck approach which has additional features like main mast illumination, shutter illumination, horizon bar lights and GSHB.

➤ **Somatogravic Illusion.** Somatogravic illusion is a false perception of body orientation to gravity at night especially during spins, rolls and happens even during a normal sustained turn. A good scan pattern and full faith in our flight instruments is the only way out.

➤ **False Perception.** When flying over unlit terrain or over the sea in dark night, an isolated light on ground may start looking like a star or part of sky giving a perception of high nose up attitude. The pilot corrects this false perception by lowering the attitude and impacts ground/water. Often after takeoff and proceeding to sea in a dark night, the receding shoreline going under the aircraft gives a false feeling of natural horizon going down. The pilot, still at low altitude corrects this false illusion by lowering the aircraft attitude. Many pilots have thus dived into watery graves. Whilst making night approach onto a runway slightly displaced from the center line, the flare path looks wider than it would be if the aircraft was along the centerline. This gives

a false perception of low height and the pilot initiates flare much higher, closes throttle and stalls on to the runway or ends up in pilot induced oscillations.

➤ **Hypoxia.** Even by day our colour vision degrades by 5% at 3500 feet, 20% at 10,000 feet and 35% at 13,000 feet due to lack of oxygen. By day Rods also cannot help us see because rhodopsin gets badly bleached by day light and needs at least half an hour to regenerate. Lack of oxygen is first felt by eyes giving us tunnel vision, followed by grey out and finally black out with the eyes still wide open before our brain goes off watch. Both Rods and Cones raise their light detection threshold with lack of oxygen. Thus using oxygen at night becomes necessary for better colour vision at altitudes especially at night.

Recommendation Our knowledge and ability to foresee and recognize illusions in time, instrument flying skills and flying experience can save us. A flight simulator is a good tool to actually learn how to recognise visual illusions or false perceptions and practice recovery actions in flight. Looking after our billion dollar 550 mega pixel resolution eyes and learn more about night vision is just 1% of what is needed to know before we takeoff into the night.

A map says to you, "Read me carefully, follow me closely, doubt me not." It says, "I am the earth in the palm of your hand. Without me, you are lost and alone."

—Beryl Markham, West of the Night (1942).

AHS AWARD *FOR INDIAN HELICOPTER COMMUNITY*



*I*n a momentous event in Montreal the American Helicopter Society awarded the “Capt. William Kossler Award for Humanitarian Service” to the Indian helicopter community, Military and Civil, for their record breaking service in saving human lives during the Uttarakhand floods in June 2013. Admiral Nirmal Verma, Indian High Commissioner in Canada, Wg Cdr Unni Pillai, President RWSI Southern Chapter and Col Sudhir Malik, RWSI Life Member received the award on behalf of the helicopter community. The award was received amidst a full standing ovation for over a minute.

The recommendation for the award was made by RWSI. The Indian helicopter community was selected as the winner after the screening committee of AHS vetted numerous recommendations from around the world.

Never before has any professional group been given such international recognition in the past. Here is an achievement that we are all proud of. We salute the brave hearts who laid down their lives during the rescue operations in Uttarakhand.

CECIL A. BROWNLOW PUBLICATION AWARD *FOR INTERNATIONAL AVIATION SAFETY*

*C*dr (Retd) Samir Kohli, has been bestowed the prestigious Cecil A. Brownlow Publication Award in recognition of a book written by him on Air Safety by International Flight Safety Foundation. It is also the first time AN INDIAN has received an award on International Aviation Safety. Cdr Kohli was a

helicopter pilot in the Indian Navy and took premature retirement to go into the realm of International flying.

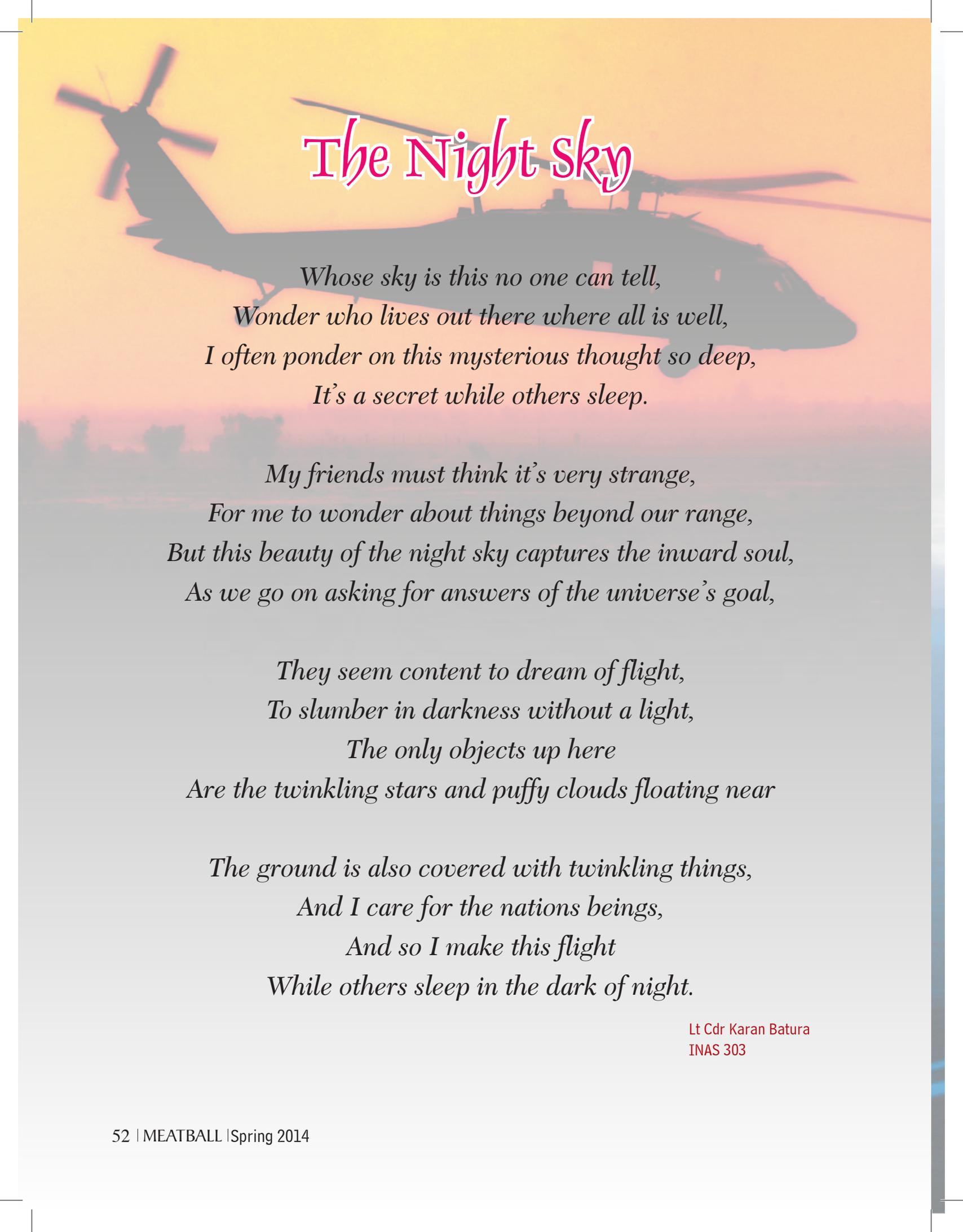
Way to go Samir, and may you keep winning laurels.

The Knight of the Night Flight

*A DUSKER SORTIE, HEADING INTO NIGHT
I TOOK OFF AGAIN, YET ANOTHER FLIGHT
THE SKIES WERE CLEAR, AND THE STARS WERE BRIGHT
AND THE COMPANY OF VOICE, “CLIMB STRAIGHT AHEAD, TURN RIGHT”
AS I PUT THE BANK AND INITIATED TURN
MY HUMMING MIXED WITH SONGS.
HEIGHT SPEED BANK BALL, AND I LOOKED OUTSIDE
I HAD CROSSED COAST AND THE SEA WAS VAST
MOONLESS NIGHT, NO SHADOWS TO CAST
THE NIGHT IS DARK AND SEA UNFORGIVING
I TOLD MYSELF, AS I TRIED TO TURN THE FEARY INTO THE BEAUTIFUL
HUMMING AGAIN, AS IF IT WOULD HELP
AND LOOKED ON TO THE DIPPING FUEL
I SHOULDVE CROSSED THE LAST WAYPOINT BY NOW
I TOLD MYSELF AS THE LIPS PURSED
HUMMING SLOWED AND FADED,
THE SILENCE ON HEADSET, I MISSED HER WORDS
SAT UPRIGHT, GAZING HARD, AS A LIGHT MOVED AWAY ON MY AXIS
SHOOTING STAR, ANOTHER PLANE...OH, I “HAVE” HEARD OF AUTO KINESIS.
STEADY UP AND RECHECK
I TOLD MYSELF IN THAT STATE OF RESTLESSNESS
THE COLD DARKNESS, NO MORE BEAUTIFUL
ATTENDING BRUTALLY TO MY CARELESSNESS*

*THE ROUTE I FED WAS PREFED FOR LAST YEAR'S DATE
AND NOW I SAW, DARK CLOUDS MOCKING MY FATE
THEN I DID WHAT TRAINING MADE ME CAPABLE OF
ASESSED POSITION ON THAT ROUTE, AND TURNED TOWARDS THE BASE
PRAYING LIKE HELL TO LET ME MAKE IT SAFELY
TUNES GONE AND REPLACED BY SWEATY FACE
TURNED AROUND AND WAITED AND SAW,
FLAREPATH VISUAL VERY NEAR TO ME
OUT OF R/T AS I WAS
AND I DESCENDED FOR FINALS WITH WAGGLING SPREE
AND AS I STOOPED I SAW THE LINE
NOT OF GOOSENECKS BUT FISHING STRAKES
HAIL MY TRAINING AND BLESS MY INSTRUCTORS
PULLED MY STICK AND CHECKED MY BRAKES
AND CALCULATED THE ETA AGAIN AND RESETTED THE BOXES
AND THE VOICE BOOMED AGAIN, THOUGH WITH SOMEONE ELSE NOW
TIMES WHEN ONLY PRESENCE MATTERS, NO MATTER HOW
AND I LANDED BACK ON THE LINE OF LIGHT
WITH GROUND BELOW MY FEET
AND LOOKED ABOVE TO THANK THE GODS
SAW THEM SMILE IN DARK FOR TEACHING ME
AND I LEARNED IT HARD AND LEARNED IT WELL
HUMMING DOES NOT HELP, YOU SEE!*

*Lt Shubham Agarwal (06655-Z)
INS Garuda*



The Night Sky

*Whose sky is this no one can tell,
Wonder who lives out there where all is well,
I often ponder on this mysterious thought so deep,
It's a secret while others sleep.*

*My friends must think it's very strange,
For me to wonder about things beyond our range,
But this beauty of the night sky captures the inward soul,
As we go on asking for answers of the universe's goal,*

*They seem content to dream of flight,
To slumber in darkness without a light,
The only objects up here
Are the twinkling stars and puffy clouds floating near*

*The ground is also covered with twinkling things,
And I care for the nations beings,
And so I make this flight
While others sleep in the dark of night.*

Lt Cdr Karan Batura
INAS 303

उड़ान सुरक्षा

जीवन का महत्व वही जाने !
जो उड़ान सुरक्षा के नियम को माने !!
उड़ना है सुरक्षित, तो रहो सावधान !
छोटी गलती से तुम, ना बनो अनजान !!

एक भुल करे नुकसान
छीने रोज़ी, रोटी और मुस्कान !
सुरक्षित करना है हवाई उड़ान
बचना, बचाना है अब सब की जान !!

उड़ान प्रतिक्रिया है ज़रूरी
हमारी जानकारी है अधुरी !
हम सब मिलकर करगें पूरी
विमान दुर्घटना से होगी दूरी !!

अमित कुमार सिंह
एल ई एम ए आर
139284-एफ
लक्ष्य जत्था

- (क) जो उड़ान सुरक्षा कि दोस्ती तोड़ेगा, वो एक दिन दुनिया छोड़ेगा !
(ख) जैसे देखभाल करें शरीर की, वैसे करो मशीन की !
(ग) ATM आपको पैसा देता है, लेकिन FLIGHT SAFETY आपको ZINDAGI देती है !!

संजय कुमार
एल ई एम ए
139128-ए
लक्ष्य जत्था

The Solution...

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Good Show



Sarjeet Singh, CHAM, 129070-T, whilst carrying out 25/50 hrly inspection on CH 431 onboard INS Vikramaditya at sea, observed radial play of approximately 2 mm on rear bearing attachment arm against nil permissible limits. The sailor immediately reported the matter to higher authorities. Defect was confirmed and classified as CAT 'A' by RAQAS (Goa). Further, defect rectification was undertaken onboard in association with HAL reps.

It is pertinent to mention that CQ of MiG-29K pilots was in progress and timely rectification of the defect on CH 431 was critical to ensure availability of SAR aircraft for progression of CQ phase. Had the defect gone unnoticed it may have resulted in an accident.

Sarjeet Singh's keen sense of observation, professionalism, dedication and attention to detail is highly commendable and praiseworthy.

"WELL DONE" Sarjeet Singh CHAM



On 22 Feb 14, during DI / DR on APU on KM 724, Bajarang V Pawar, AA4 observed that low oil quantity caption was illuminating spuriously with the actual quantity in the system being normal. The sailor undertook an in-depth analysis of this perplexing problem which revealed that the calibration of the dipstick in the APU oil tanks of the new batch of helicopters was inaccurate. This led to calibration of all APU oil tank dip sticks by the resident Russian Warranty team and the same was incorporated as a modification on all the aircraft subsequently.

The sailor, through his innovative efforts, contributed handsomely towards accomplishing organisational goals and is an inspiration for all his peers and juniors.

"WELL DONE" Bajarang V Pawar, AA4

Good Show



On 10th Jan 14, whilst carrying out BFS on Dornier IN 226, T Nageshwara Rao, LAM observed a hair line crack on LH aileron composite fabric material. Though not part of the BFS routine the sailor further undertook microscopic study of the region and reported the matter to his superiors. Had it gone un-noticed the crack would have further developed resulting in damage to the aileron and complications in flight. T Nageswara Rao, LAM displayed a remarkable sense of dedication and initiative towards meticulous study of the defect.

Observation of this kind of unusual damage reflects his professional competence and commitment to service.

"WELL DONE" T Nageshwara Rao, LAM



On 27 Feb 14, whilst carrying out BFS on KV 582 onboard INS Ranvijay, prior to a tactical sortie of TROPEX-14, YS Rao, LAM observed a small crack of size 3cm x 1cm on the pocket number 2 of lower rotor blade number 1 whilst cleaning the rotor blades to remove the unwanted grease deposits accumulated post 50 hrly ground run. The sailor immediately reported the matter to the FSI. Had the defect gone unnoticed it would have resulted in slow wither of the blade structure in the air resulting in a catastrophic blade pocket shear from the spar. The sailor's keen sense of duty resulted in identification of an inconspicuous defect in an inaccessible area.

The sailor's eye for detail and excellent sense of flight safety avoided a major accident. His high degree of alertness and keen sense of duty, even in adverse conditions at sea, is highly commendable.

"WELL DONE" YS RAO, LAM

VITAL ACTIONS BEFORE NIGHT FLYING



REST

BRIEFING

MEDICALS

PRE FLIGHT MEAL

NIGHT ADAPTATION



ALCOHOL

SMOKING

STRESS

FATIGUE

BRIGHT LIGHTS

LT CDR ANIL RATHEE
INAS 339



Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity or neglect.

